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WATER SUPPLY,

ETC.

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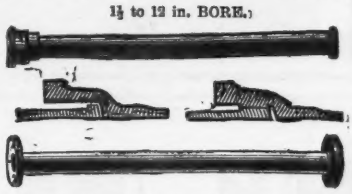

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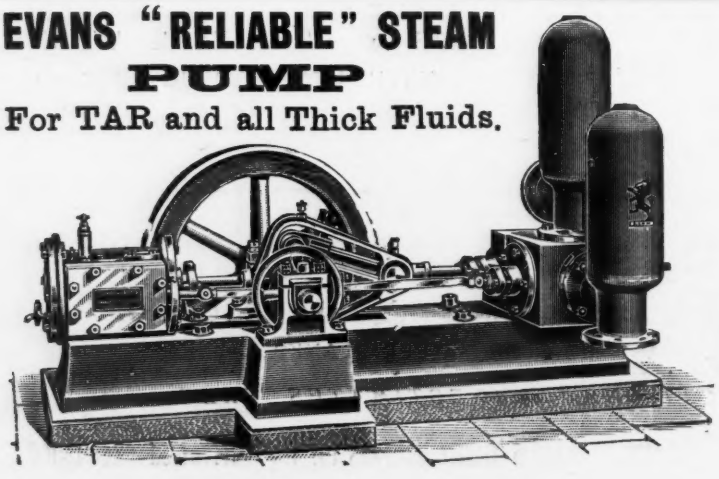

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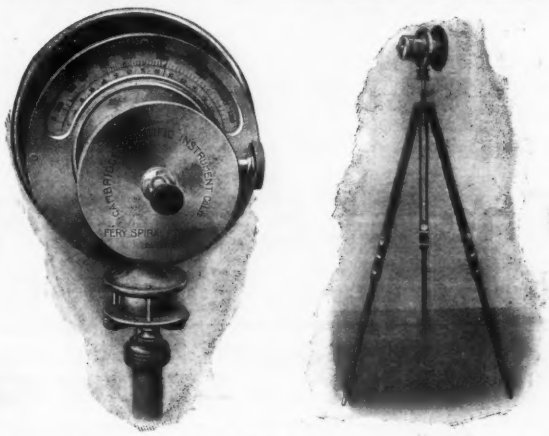

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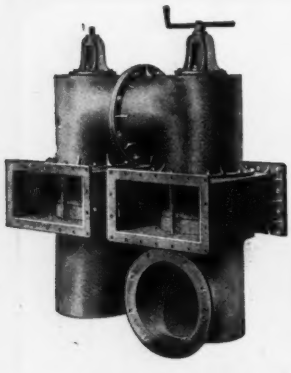

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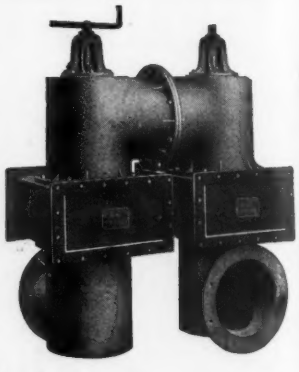

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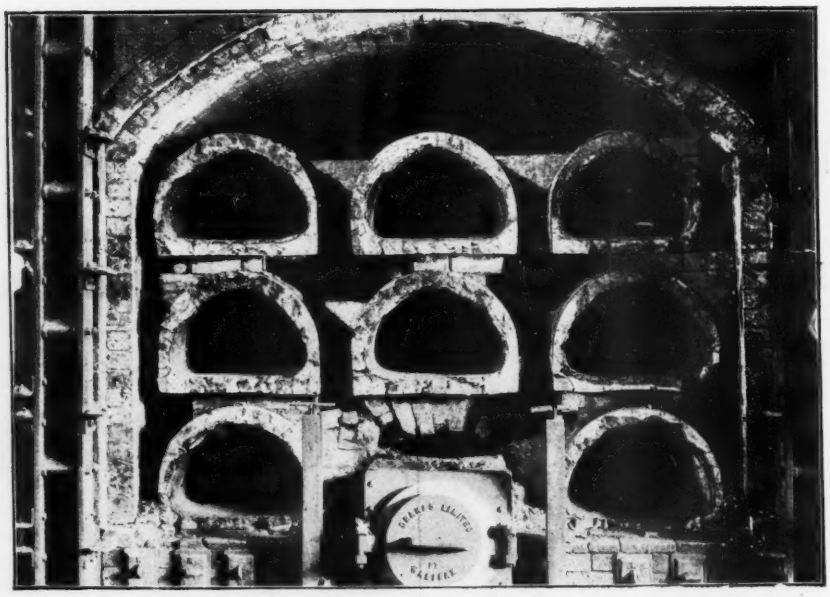

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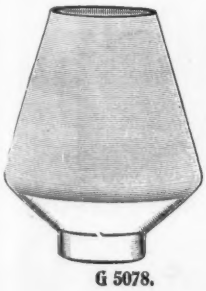

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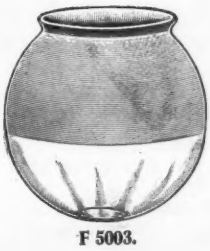

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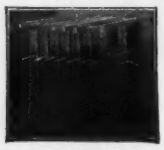

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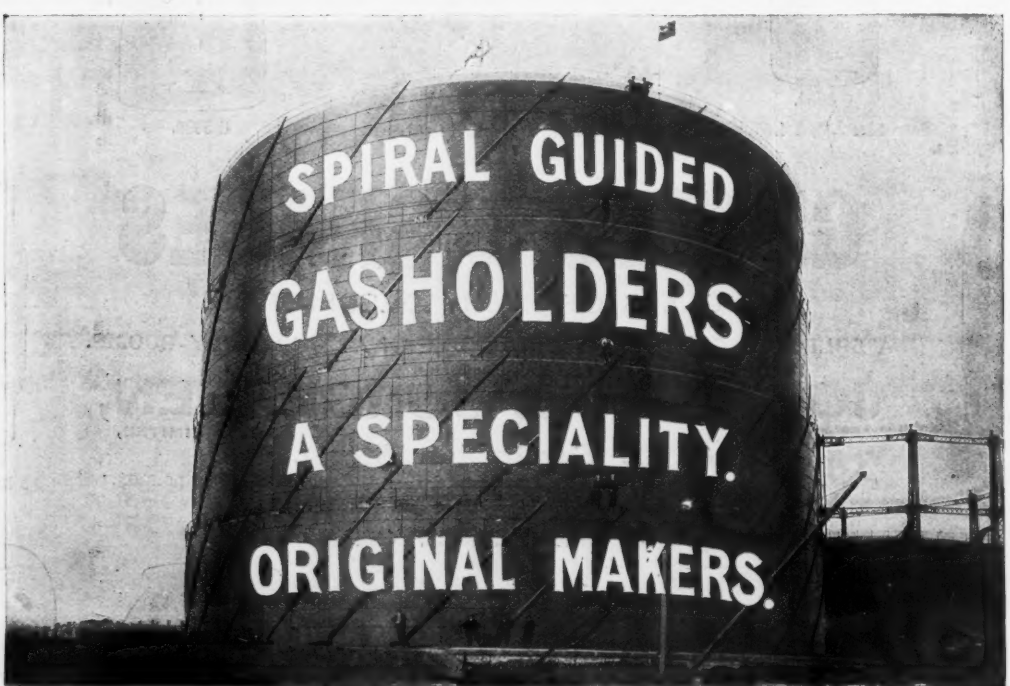

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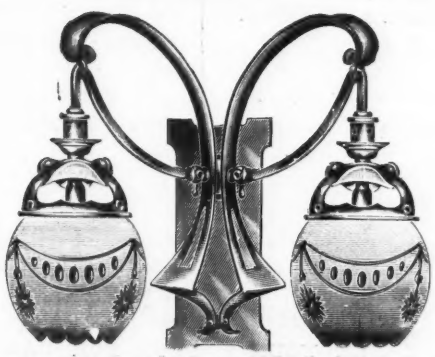

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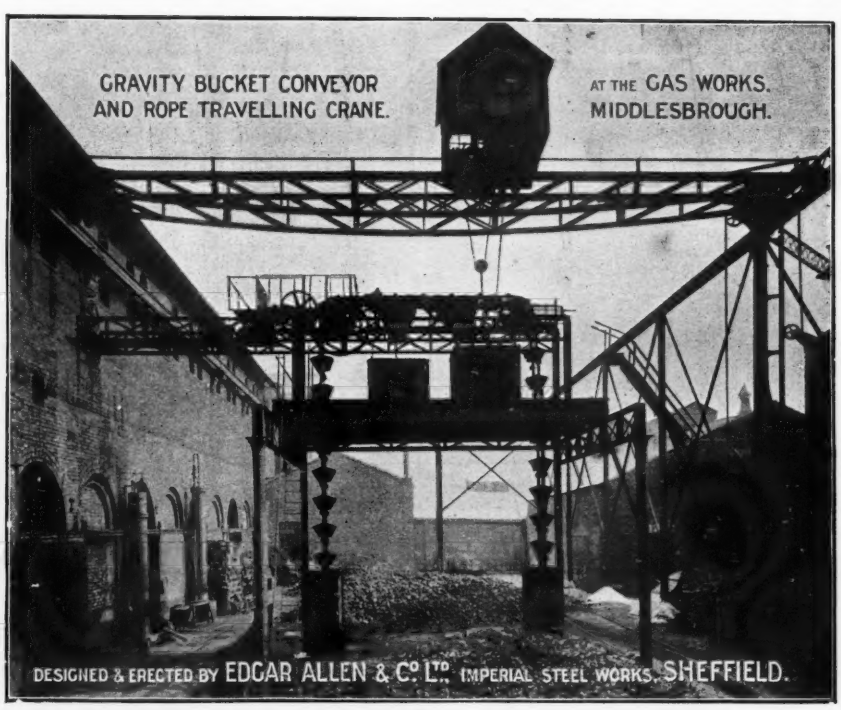
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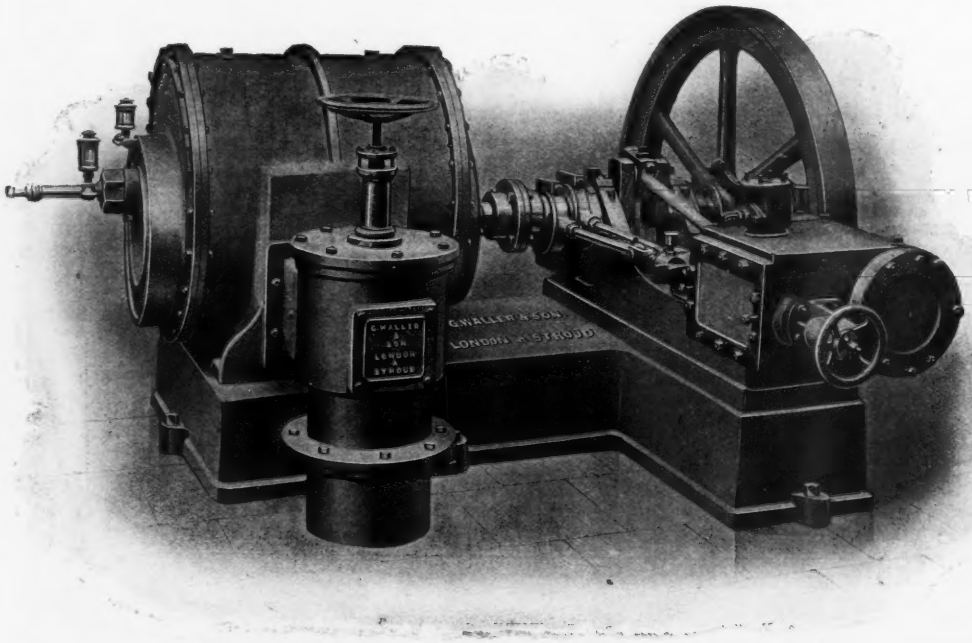

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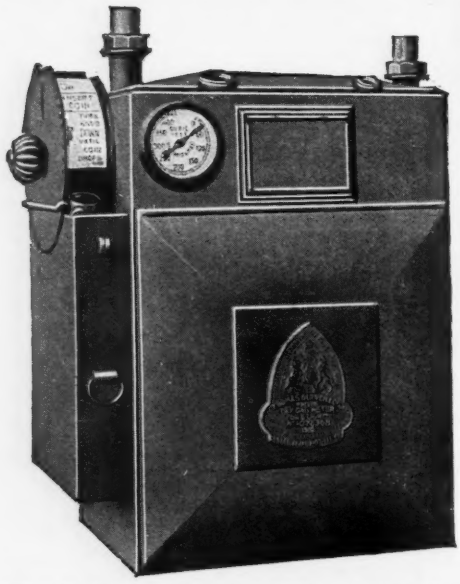

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EDITORIAL NOTES—GAS, &c.

The Calorific Standard—A Comparison.

THE publication in the "JOURNAL" last week of a translation of Professor H. Bunte's lecture on the subject of what quality of gas best meets the requirements of consumers at the present day, comes opportunely immediately after the publication of the text of the calorific power clauses of the Gaslight and Coke Company's new Act. The provisions of these clauses were referred to in our "Editorial Notes" on the 21st ult.; but since they may be regarded as suggestive of the lines for similar enactments in respect of other gas undertakings at home and abroad, a comparison of them with the provisions which a number of German gas-works' chemists in conclave are reported to have considered as reasonable, will now be of interest.

The German chemists debated the question of the proper quality of gas for present-day requirements, and came to the conclusion, which Professor Bunte endorses, that the gas supplied should have a gross calorific power equal, in English terms, to 543 B.Th.U. per cubic foot as standard, and that fluctuations from that standard should be as small as possible, and the value in any case should not fall below 522 B.Th.U. It is stated that the Berlin Corporation undertaking is observing the standard calorific power approved by the chemists. The Gaslight and Coke Company's new Act prescribes a standard calorific power of 125 calories net per cubic foot, which, assuming the net figures are 10 per cent. below the gross, is equivalent to a standard of 550 B.Th.U. gross per cubic foot. This is rather higher than that which the German chemists consider reasonable. But the Gaslight and Coke Company are liable to incur a forfeiture if the calorific power of their gas falls below 112½ calories net, which is equal to about 496 B.Th.U. gross per cubic foot. This figure is lower than the minimum value which the German chemists approved. But it is not clear that they would be willing to accept that minimum if their gas undertakings were to be liable to a substantial penalty on every occasion on which the gas supplied might chance to fall slightly below it. Moreover, their willingness to accept such a minimum counts for naught; for the manager of the gas-works would certainly not entertain it, and it is the manager and not the chemist of a gas-works who is ultimately responsible for the maintenance of the proper quality of the gas supplied. The manager may be willing to accept 543 or even 550 B.Th.U. gross as an ideal to which he would endeavour to work; but he will not at the bidding of his chemist agree to supply gas which shall never fall below 522 or even 500 B.Th.U. gross per cubic foot. He will demand some more reasonable latitude for a depression in quality which, in the stress of manufacture in that concatenation of adverse working conditions which it is beyond his power always to escape, is sooner or later bound to occur. It should be remembered, further, that the German figures refer to testings made at the gas-works, and that some allowance must be made for depreciation of the value of the gas on occasion in transit to a testing-place (say) 8 miles from the works. It will therefore be seen that, even on the basis of the German chemists' standard, the new Act of the Gaslight and Coke Company imposes too high a figure for the calorific power of the Company's gas. Other gas undertakings should clearly refuse to work to a standard exceeding 500 B.Th.U. gross per cubic foot, or be penalized for gas which is not below 450 B.Th.U. gross per cubic foot. The Gaslight and Coke Company have on this occasion agreed—if we read the clauses of the new Act rightly—to submit to a penalty of £25 to £100 if two testings of calorific power on any one day show a mean of less than 106¼ calories net per cubic foot, which is equivalent to about 470 B.Th.U. gross. This is altogether too high a figure for catch-penalty testing, even if reasonable for the average of three days' testings.

When considering the action of the German chemists in expressing approval of a comparatively high calorific power for gas, it must be remembered that the bulk of the gas supplied in Germany is coal gas pure and simple. There is but little carburetted water-gas plant on German gas-works, owing to the high import-duty levied on petroleum and its products, and the advantages of a supply of mixed gas of lower calorific power than neat coal gas are less marked in Germany than here. It has remained for Professor Strache, of Vienna, to enter a forcible protest against the acceptance by the gas industry on the Continent of the standard of calorific power approved by German chemists. He went further and urged managers to do their utmost to prevent the industry being fettered in regard to the quality of the gas supplied. He gave the very cogent reason for this advice, that it was by no means settled that gas of the proposed calorific power was as serviceable to the consumer as gas of considerably lower quality. The gas industry should be left free to adapt the quality of its supply to the advances in processes of manufacture and in the construction of burners for lighting and heating. And Professor Bunte, in replying, has had to confess, in effect, that the proposed standard of calorific power had been selected without regard to future developments in the manufacture and use of gas. Could anything have been said more detrimental than this confession to the proposal of the forty odd German chemists?

Vertical Retort Position at Home.

THE question of carbonization in vertical retorts has now in this country reached a most interesting stage, as entry is about to be simultaneously made into experiences by comparatively large installations under home working conditions. This week it is our pleasure to be in a position to publish a description of the installation of nine settings of four vertical retorts on the Woodall-Duckham system at the Burnley Gas-Works, which settings are accommodated in a fine large retort-house (with coal-stores adjoining), constructed to the designs of the Engineer, Mr. J. P. Leather. The buildings and their equipment incorporate some special features which supply the interesting detail for the descriptive article. This Burnley installation presents us with one design of a house that is specially suited for vertical retorts; in the description of the Kensal Green installation that was recently published, there was an account of a simple method of giving a little more headroom in an existing house, which was not quite high enough, immediately over the settings, for the superstructure. It is in such details that the engineer (who is already fully acquainted with the features of the new systems) will find interest in considering what his own procedure would be in adopting one or other of the vertical retort systems. In the Burnley installation, one main feature is that the stanchions supporting the roof from the ground level, also serve to carry the bed (9 feet above the ground level) of the vertical retort settings, act as buckstays to the settings, and carry the overhead coal-hoppers. Thus they are made to serve four distinct purposes. However, the whole of the principal points of constructional interest are collected together elsewhere. Of general interest is the coincidence of entry into working of installations of verticals on different systems. The Woodall-Duckham settings erected at Kensal Green and Burnley are now within a few weeks of being ready for gas making; the Sunderland installation of Dessau verticals is only waiting to commence gas making for the finish of the complete scheme of works reconstruction that Mr. C. Dru Drury has had in hand. The two settings on the Glover-West system at St. Helens continue, without hitch, to keep up their good record of results; and it will not be a great while before the Manchester Corporation will be having an installation on this system, which may be, if the results confirm anticipation, simply the precursor of a larger one. The members of the Manchester District Institution of Gas Engineers will shortly be paying a visit to St. Helens to witness the operation of the Glover-West settings,

and to make personal inquiry into the working. They, as well as other readers, will be greatly interested in the third set of tests that Dr. Harold G. Colman has made of further varieties of coal in the St. Helens settings. In comparing the results obtained by Dr. Colman as published on June 8, July 20, and now this week, sight must not be lost of the different coals employed. The results of the trials published this week with 57 tons of Yorkshire silkstone, and about 82 tons of Wigan Arley coal, indicate that the make in the Glover-West retorts is probably about 1000 cubic feet per ton better than is realized under fairly good horizontal working with these coals, though perhaps a little is forfeited in respect of illuminating power. But the calorific values are good, and the analyses of the gas indicate a low content of inert constituents. The general position of vertical retort installation at home is such that interest will be further stimulated; and the results of the coming winter's operations under normal conditions will no doubt cause a spurt in adoption next constructional season.

A Wide Review.

If among the administrators of the gas industry there be any who harbour doubts as to the necessity of a gas engineer and manager of a gas undertaking being a man of many parts—talented in engineering and management and in commerce, and having a comprehensive grip of multitudinous affairs—then we counsel them to quietly peruse the Presidential Address of Mr. T. H. Duxbury to the North of England Gas Managers' Association last Saturday; for there they will find more than sufficient to dissipate their doubts. The address gave full expression to the faith of the President on numerous topics affecting the daily work of the gas engineer and manager. Their very number would make the task of enumerating them far easier than that of finding, by the most painstaking inspection, the subjects occupying current thought that are not touched upon. There is a broad appreciation, in the early part of the address, of the technical and the commercial requirements of the gas engineer and manager, and of individual capacity, which requirements and capacity have expanded in proportion to the technical and commercial changes of the age in connection with gas production, distribution, and application. Works of greater value in constitution and capacity are now under care of the engineer than formerly; and his operations have to be shaped to the commercial needs outside the gates of his works, where, again, the keenest instinct and ceaseless activity have to be brought to bear to meet the competition of the day. There is an increase of responsibility all round; and the quality of work that served a former day after a fashion is no longer good enough. Gas company administrators must recognize this; for in a contented and skilful engineer and manager they have the greatest protection of their interests.

But with all this expansion of responsibility and diversity of service, we should realize that human efficiency must be rapidly impaired if there is not some relief; and this points to a certain amount of devolution—not from capital responsibility, but in a greater departmentalizing of the work, with, at the department head, a chief responsible to the Engineer. We have sympathy with the President in his objections to there being any cleavage of the technical and commercial work of a gas undertaking, unless there is likewise a supreme technical head. There are, of course, instances where there are managers of the commercial interests of a gas undertaking distinct from the officials in whom the chief technical responsibility reposes. That such division has been financially successful is not proof of the correctness of the system, but is rather proof of the fitness, aptitude, and diplomacy of the individuals occupying the positions. It is quite conceivable, as Mr. Duxbury says in other words, that all the arduous endeavour of a technical official to put gas into the distribution mains cheaply, and to produce economically his bye-products in a form to secure the best prevailing market advantages, may all be swamped, in the financial issue, by a mediocre conduct of the commercial department. There he puts his finger on the danger spot. However, in the official life of the gas industry, opportunities for position, credit, and (we hope we may add) reward were never so great as now; and, we venture to say, they will be even greater still. We do not believe in making positions to fit men; but the mutations of recent years in connection with the work and trading of large and even moderate sized gas undertakings have made many positions which must be filled by men of suitable qualification and capacity. The most important thing in the whole administration of the industry is to get the right men. With the right men in official positions, the correct policy will be submitted to, and be adopted by, Directors and Committees, if obstinacy and egotism (which are usually conjunctive attributes) are not allowed to overrule.

The President is one who holds views on the affairs of his technical and business life that have about them the evidence of the originality that comes from personal examination and thought. Mr. Duxbury is quite in agreement as to the necessity for the amendment of the Gas-Works Clauses Acts. They have a heavy weight of obsolescent provisions to be cleared away; and big deficiencies to be filled. But he thinks the time, in the present state of the political atmosphere, is inopportune for movement to this end, and that there should be a little delay in the matter. At the same time, there can be no two questions that the sooner there is revision, the better will it be. If the fear only of fresh impositions is to keep one back from pressing forward for what is known will be an advantage, then the lane will be a long one to the goal. Whether or not we wish to wait, we are perforce compelled to do so through the position of the work of an ambitious Government. They have no room for anything more than is now in hand. When, however, the General Gas Acts are brought up to date by revision, excision, and amplification, it will help to modify the costliness of obtaining private statutory powers over which the President makes complaint, and which costliness does not fall directly on the responsible combatants, but on the ratepayers of the town concerned, and, if gas consumers, on them in their dual capacity. The President has much to say on parliamentary and statutory matters. The sliding-scale of prices and dividends that most of us agree came to the gas industry as a boon and a blessing, he looks at a little askance, because of an experience at South Shields. It is thirty years ago since the sliding-scale was applied to the Company in the stead of a maximum price; and while it was for a period an excellent thing for consumers and shareholders, it was a bad thing for the works, which—in order that low prices for gas might be charged, and the payment of higher dividends be allowed—were not maintained in the position in which they should have been. Thus upon the President has largely fallen the duty of repairing the inevitable mischief of such short-sighted procedure. But this was not the fault of the sliding-scale; it was a fault of the administration. The administration alone were censurable for an abuse of a privilege and liberty; and when Mr. Duxbury says—relative to the advantage of the sliding-scale as against the maximum price principle—that every case requires to be dealt with on its merits, his own illustration suggests that the first point to be considered is as to whether the Board of the undertaking concerned is worthy of confidence in exercising the new powers. Administration such as that referred to as being of the history of South Shields must bring retribution at some time or other, but is not alone sufficient to condemn a principle.

Still on statutory questions, and regarding the President's feeling that it is a pity the Gaslight and Coke Company accepted a calorific power standard and test without the illuminating power test being abrogated, we are afraid that Mr. Duxbury does not fully comprehend the forces that impel to a good many disagreeable things in Metropolitan gas politics, owing to the number and influence of the authorities and interests concerned. In this matter, he appears to be conjuring up *ignes fatui* unnecessarily, This was an agreed insertion of penalty testing for calorific power, and is not a precedent created by Parliament. Parliament has this session declined to create any such precedent; and we have sufficient faith in the parliamentary authorities who have influence in such matters as this to believe that they will continue to recognize the injustice of placing the industry under a dual standard of quality for a single commodity, and that such an eventuality need not be a disturbing factor at the present time. The position, however, will have to be watched carefully; and if there is any sign of such an injustice being perpetrated, then there will have to be stern resistance. There is no such sign at present; the indications of the past session being of a diametrically opposite order. Another objection that the President apparently entertains to the test is the use of the Boys calorimeter, owing to the limit in its range when working under winter conditions with mixed coal gas and carburetted water gas. This, however, is a matter we will not attempt to probe too critically; and in his reference to it the President, we observe, is cautious, though suggestive.

One of the most interesting sections of the address was that in which the coal position and the influences of prices and quality are discussed. Mr. Duxbury spoke well and to the point in these matters, though he opened the door to political controversy by defending a tax on exported coal. Our view is identical with his; and it has been confirmed by events and experience since the tax was removed. "It is an "economic error," say those of different opinion, "to suppose "that inflicting a tax on foreign-bound coal for the purpose "of reducing its export is advantageous to the country; "seeing that it restricts the money brought into this country, "and the labour required for producing and handling the "coal." What, on the other hand, have the last few years taught us? We have learned that the demand for coal from abroad can be made the means of maintaining the prices of coal at home (although home conditions do not warrant the high prices) to the detriment of home industry and labour and of the living costs of the community. This being the experience, we fail to see the economic error. Conjointly with the restriction of coal exports by taxation, the President thinks that, conservation of the supply might be effected by the universal substitution of gaseous for coal fuel. Not only should such a change be favourably regarded from the point of view of conservation of the coal supplies, but from that of the economic advantage of saving much that is useful, but which is lamentably wasted by the crude process of obtaining heat by the ordinary coal fire. Mr. Duxbury shows how since 1896 the price of coal has consistently been maintained at considerably higher levels than before; and the trend of events points to those levels being maintained, if not even raised, in the future. This indicates the great care requisite in coal selection for the purpose of gas manufacture; and on the question of coal-testing prior to effecting contracts, the President made some direct and valuable points.

There was more topic in the address than can possibly be commented upon here. The review of gas manufacturing practices and of commercial methods brought before us the judgments of a discriminating mind. One point only in connection with trading may be emphasized by reference, and that is on the question of free maintenance which is so very much in the air at the present time. For two years, this has been the practice at South Shields (the period alone is a testimony to foresight); and the results are described as being "very satisfactory." That is the experience of others. There is in the address the portrayal of a strong commonsense and prescience dominating the executive activities of the South Shields Gas Company; and so long as this continues, so long will—given good times industrially—progress and prosperity attend the undertaking.

Work and Economy in the Gas Industry.

THERE were many wise things said on the gas themes of the day at the meeting of the Welsh Association, in the old-world town of Tenby last Wednesday, under the presidency of Mr. A. H. Brookman, the Engineer and Manager of the local gas-works, the Directors of which extended a warm-hearted welcome to the visitors. Mr. Brookman's address was a model of terseness, and of original thought from the outlook of one who has the responsibility on his shoulders of the successful working of a comparatively small undertaking. The word "responsibility" induces the passing remark that the responsibility of the official conduct of a gas undertaking of relatively small size is sometimes heavier than in the case of a larger works, where the chief usually has several trusty lieutenants who share with him his responsibility, and so give him relief. The value of district organizations to the managers of these smaller sized concerns (as well as to those of larger ones) is unquestionably immense. This was a point in the presidential address; and it is quite true, as said there, that the District Associations occupy a position the Institution can never possibly fill. In every way—in ease of assembling the members, in the degree of town visited, in collecting the views of men in all sorts of working spheres, and of all shades of opinion and levels of experience—the District Associations possess mobility and influences which cannot be claimed by the larger Institution. The special usefulness of such Associations could not be extracted from, nor could their special fuctions be merged in, the more influential central organization. The President of the Institution (Mr. James W. Helps) was, as he ever is on such occasions, a welcomed visitor at the meeting; and he spoke on the subject of unity being strength, and of the advantages of the professional organizations being interwoven as they are by the simple process of affiliation and participation in the directive counsels of the Institution. It has often occurred to us that the District Associations are as important to the Institution as—perhaps more so than—the Institution is to them; for they serve as a means of frequent communication and as intermediaries between the Institution and the sources of finance in a way that no ordinary circularizing can effect. In the collection of funds for carrying on the technical work of the industry, the District Associations have been very helpful to the Institution; and in fortifying the resources of the Benevolent Fund they have also done exceedingly well. This meeting, too, afforded Mr. Helps an opportunity of making yet another appeal to Directors and Committeemen for assistance in carrying on the technical research work of the industry. We do wish very sincerely over this matter, that the President of the Institution could obtain such assurances of financial support that he would not have occasion to feel after each appeal, through the sparseness of result, that his voice had been as that of one crying in the wilderness.

There was much said at this meeting about economy—a word which is much abused, and a word to which curious meanings are applied in some quarters of the gas industry through a singular form of mental depravity or of selfishness. With some administrators, "parsimony" is synonymous with "economy." It cannot be seen by them that the provision of funds for technical investigation is, through ultimate advantage, an economical proceeding; nor can they see anything but economy in offering starvation wages to men specially educated to look after the interests of gas undertakings. The President in his address shot some well-directed shafts—we hope they will reach their destined place—on this question. To what practical end, he asks, is the higher education of the young men of the gas industry being directed in their own interests? Judging from advertisements that have come before him, he finds that the only practical end is the serving of the industry, and that the "practical end" for the educated young man is frequently inadequate remuneration. It is a serious charge; but it is a true one. There are many gas administrators who are bad payers, and who assist to bring obloquy upon the industry, and to detract from it as a field of service. In this respect they are the enemies, and not the benefactors of the industry. This ought not to be; and those who find economy in parsimony may be asked to ponder well, and consider the meaning and effects of, the words in the address: "Until a "reasonable financial inducement is much more in evidence "than it is at present, the best abilities will not be attracted "to the gas industry."

There were other directions in which "economy" was considered at the meeting. They are found in both the address of the President and the paper by Mr. J. H. Canning, of Newport. The chief of a small gas undertaking finds one of his most serious responsibilities is in properly determining whether or not the adoption of a new process or plant will be economical. His limitations are very great in making such a determination. A wrong decision may land an undertaking whose resources are restricted into grave difficulty. Hence the reticence so often seen in the matter of improvement in small works. Mr. Brookman's own works are a testimony to perspicacity in this regard. While economy of capital must be kept well in view in relation to improvement, it must not be worshipped so blindly that the economies of working from improvement are lost to sight; and it was with these latter economies that Mr. Canning was chiefly concerned. We have known small works where there was sufficient waste going on daily through adherence to antiquation as would alone have provided sufficient recompense to meet the financial charges arising from the provision of more economical plant. Decision in these matters requires discretion. Again, what may be economical in one works may be absoulutely ruinous in another. That is one of the many precepts in regard to gas-works economies standing in Mr. Canning's paper; but it is a view of the question that is all too frequently disregarded. As he says, it is impossible to lay down any general scheme of effecting economies which shall be beneficially applicable to any and every works. And so the only thing to be done is to take every case independently, and make a thorough investigation into the probable profitable issue of change—adopting that which appears to be, from the thorough investigation, the "most economical "means available under the special conditions" of the works concerned.

Mr. Canning looked, in his communication, illustratively into several matters, the seats of waste or economy in gas

works—in the retort-house, in the application or otherwise of mechanical operation, in the use of various forms of power, and in smaller affairs. In all of which, environment must have, or should have, large influence in decision. The paper was full of pithily expressed wisdom in relation to the subject. A few words more. It was learned by the members that in the search for economical practices Tenby had, many years ago, taken a part that is extremely interesting in these days. The late Mr. G. W. Stevenson made trial at the works of a continuously operated vertical retort, through which ran a shaft with short lengths of worms or screws keyed on at intervals. Failure of this retort came through the impossibility of the shaft standing the intense heat to which it was subjected. Had Mr. Stevenson used a portion of the worm-girt shaft outside the top of his retort and a portion at the bottom for extracting the spent charge, it is possible he might have saved the inventors of continuous carbonization in these latter times a great deal of trouble and worry; but he might also have robbed their generation and times of the interest and fascination that their work has given.

Free Space and High Temperatures in Verticals.

From the time the Dessau vertical retort system reached the degree of perfection that can be now claimed, in respect of the carbonization of intermittent charges, we have pointed out that those who produced the workable and efficient combination now commonly known by the above appellation deserved all honour and full protection of any rights to which they have clear title under their patents. Possibly there are few of our readers who could really define the full claims without reference to the text of the several patent specifications which incorporate the system as now designed and worked; and it is not for us to presume to offer an opinion as to how far those claims could be legally sustained. It is an uncommon thing to find in "Journal" editorials reference to advertisements appearing in its columns; but in the advertisement published by the Vertical Gas-Retort Syndicate, Limited, in this issue, there is an extract from the Dessau patent specification (No. 1393 of 1904), which at this time is particularly interesting to gas technicians who have made themselves intimately acquainted with the vertical processes that are offered for acceptance. In this one extract from the patent is the kernel of the Dessau system. We do not know—and it is not our business to inquire—whether the publication is intended as a challenge, or merely as a gentle reminder. But whatever the intention, the fact remains that this excerpt distinctly claims, as part of the Dessau system, the avoidance of free space in vertical retorts and the use of higher temperatures than had hitherto been usually employed in gas manufacture. In the German patent of July 29, 1903, the claim as to the exclusion of free space is emphasized by the unambiguous phrase, "completely filled with coal, so as to avoid any "free space in which tar might be separated below." It will be remembered that the German Law Courts have given a decision in favour of the validity of the German patent, including these points as to the avoidance of free space, and as to higher temperatures than had hitherto been commonly applied in carbonization for gas manufacture. A summary of the judgment appeared in our issue for July 13 last (p. 96); and it is specially interesting to-day. It awards to the patentees of the Dessau system the rights to the discovery of the advantages following avoidance of free space. If—we emphasize the word "if"—such a claim could be upheld in this country (which claim is distinctly made in the extract which suggested this comment), then there is no form of vertical retort, continuous or intermittent, in which the retort is filled by the charge of coal, that would not infringe this particular right. It is a broad and comprehensive claim; and the publication implies a desire that it should be recognized.

In Smoother Water in Dublin.

In the address delivered by Alderman W. F. Cotton, the Chairman of the Alliance and Dublin Gas Company, when moving the adopting of the report at the half-yearly meeting last Thursday, there were gratifying indications that the relations between the Company and the Corporation are more amicable than they at one time were. Not very long ago, it seemed that there were people in and about the Council Chamber who were continually on the look-out for an opportunity to pick a quarrel with the Company; and it was a good thing that, in their Chairman, the shareholders had an able representative to repel the attacks made upon them collectively. No one denies the right of the Corporation to safeguard the interests of the general body of ratepayers when they consider these are being interfered with by a private concern; but the right may be exercised in a particularly offensive way. The Company have lately passed through the ordeal of a parliamentary inquiry; and while in the House of Lords their Bill was passed without material alteration, in the House of Commons it was not allowed to do so, being opposed by the Corporation and some of the out-townships. Here was an opportunity for incurring costly litigation; but the Directors of the Company, with a desire to avoid it, met the representatives of the opponents in a friendly spirit, and, after several interviews, an arrangement was practically come to. The points in dispute were ultimately settled in Committee, and the Bill passed. Its scope was fully indicated in the "Journal" last week; but it may be mentioned that as from the 1st of January next, the standard illuminating power of the gas will be 14 candles instead of 16, tested by the latest method, and supplied at reduced prices. A hope may be expressed that the new conditions may give all-round satisfaction, and lead to an increase in the Company's business. Owing to the general depression in trade, there was a falling off in the receipts for gas in the past half year; and the net profit was insufficient by £4034 to pay the full dividends. However, after drawing upon the reserve fund for this amount, there was left to its credit about £40,000. The Directors and officers have had a trying time; and they well deserved the vote of thanks that was accorded to them by the shareholders.

Three Coalite Reasons—The First.

Winter is again close upon us; and there has been no booming of coalite such as to cause the householder to delay stocking his cellars with coal in favour of the material that was to bring about elysian conditions in our cities and towns. This being so, the shareholders in the Coalite Syndicate and the British Company may continue to entertain the belief that their gratification in respect of dividend is something that has still place among the great uncertainties. The only coalite booming has been in the share market; and the shares of the parent concern and of the British Company have been creeping up to higher prices than those at which they stood, with a drooping tendency, for some considerable time. The cause of this share exhilaration is not distinctly known, but that centre of profound knowledge—the "Daily Mail"—has published three reasons for the upward movement. There is only one of the three that is definitely stated. The "Mail" mentions that it has official authority for the statements; so that we presume it may be taken as true that the "Syndicate has now liquidated about half its obligations to British Coalite on the underwriting contracts, and that British Coalite has accordingly been put into possession of a considerable amount of cash." The underwriting exploits of the Syndicate in connection with the British Company, it will be remembered, landed them with large responsibility in the matter of shares that an ungenerous and unappreciative public declined to take up; and the Syndicate could not discharge that responsibility. It may therefore be surmised that in the market animation a considerable parcel of these shares has gradually been landed upon those who have been looking for quick profits on the rise (by whatever means effected) of the market quotations. We have no doubt the British Coalite Company are glad enough to get hold of some cash; for there has been little coming in, but a constant drain has been going on.

The Second and Third.

Well, now, as to the other two reasons for the apparent moderate rehabilitation of confidence in coalite in the share market. These reasons are founded on shifting sands. Negotiations are said to be pending with continental applicants as to coalite patent rights, and are "nearly" complete; and two or three big deals favourably affecting Coalite, Limited, and British Coalite "may" thus be carried out. There is nothing very tangible about this; there is doubt reposing in that word "may." The official information is very guarded, and necessarily so in self-protection. As between negotiation and completion of deal, as the Coalite people have learned well by experience, there may be many a slip. Regarding the third reason, the announcement is made that "British Coalite has obtained, or is obtaining,

important contracts with gas companies." Observe, again, the guarded form of this announcement. Information as to "important" movements in the gas industry generally reaches us; but there is confessedly no knowledge of "important" dealings with gas concerns other than those—if they may be classified as important—of which publication has already been made. The question, however, as to the degree of importance can be reserved until there is more information as to the nature of these esoteric contracts. A communication from our "Coalite" friends assures us that they have nothing to add to, or withdraw from, the statements in the "Daily Mail." However, our morning contemporary, which is not always so precise in giving evidence of wariness in the acceptance of information, ends the announcement with the remark: "These are official statements; for conclusive definite information as to the position, we must await the report, which, it is stated, will be issued about two months hence." These protective words contain a slight on the "official" veracity of the Coalite concerns. Things have come to a pretty pass in the matter of confidence when even the "Daily Mail" thinks well to qualify its news in this manner.

The Ways of Promoters.

Dated Aug. 3, a prospectus was issued by the South Lincolnshire Water Company, asking for subscriptions to £3000 first mortgage 4½ per cent. debenture bonds at £10 each. It seems that this, to use a colloquialism, was merely a "bit to go on with"—if obtained. Last week the daily papers circulated, in big advertisements, the information that the Company's Directors were prepared to receive applications for £20,000 of ordinary capital and £6000 of 4½ per cent. debentures, with respectively a guaranteed dividend and interest of 5 and 4½ per cent. for three years. The Directors who issued this invitation, it is noticed, are J. Lewis Hampton, Richard Barnes, George Capes, and A. H. Brown. George Capes was (or is) a Director of the Bude Gas Company and of the Brockenhust Gas Company; and Mr. Brown is also a Director of the latter. His name did not appear in the South Lincolnshire prospectus issued in August; so that apparently between then and now he has been appointed. But these names indicate the connection of the South Lincolnshire Company with the professional promoting group in which the names of Preston and Painter have prominence. It is unnecessary to go any further in making a critical examination of the prospectus. Incidentally, however, it may be noticed that the promoters have got into trouble with Mr. Otto Hehner, the well-known analyst. He has addressed a letter to a daily contemporary complaining that these people have in the prospectus used his name, and a qualified report of his on a sample of water, taken by someone he does not know, and in a manner unknown to him, and which sample was unfit for bacteriological examination. Organically his analysis showed the water to be pure; and there were no indications of pollution. But in his report Mr. Hehner would not go further. He was requested to support the Bill promoted in Parliament by these company promoters; but he had had no opportunity of investigating the supply, and his information was all too scanty to justify him doing so. Naturally and properly, on these grounds, he protests against his name being used in connection with the present promotion.

Successful Profit-Sharing.

As has been the case elsewhere, the experience of profit-sharing in connection with the Chester United Gas Company has been a pleasant one. Success of a pronounced type has been the result; and, judging from the proceedings at the annual meeting of the profit-sharing employees an account of which appears in the "Miscellaneous News" columns to-day, everybody is—as would naturally be expected—thoroughly satisfied with the scheme. Chester was among the pioneers of profit-sharing in gas-works; their scheme having been introduced as long ago as 1901. The undertaking is, of course, not a very large one, and so the employees are not numerous. But bearing this fact in mind, the figures quoted in the report are of a highly encouraging character. Since its inception, an appreciable amount of stock has been acquired by the employees under the scheme; and in addition there is a substantial amount of money standing to their credit. Emphasis may here be laid on the following statement in the report: "The bonuses accumulated under our profit-sharing rules have in some cases of illness been of great assistance; while the considerate efforts made by the employees to relieve the anxiety and suffering of ailing workmen have been frequent and liberal, and the development of such good-will and brotherly feeling can only be secured by following the true spirit of co-partnership." Evidently at Chester "co-partnership" in the widest and best sense of the word is thoroughly understood; and both the Company and the employees are to be congratulated on the fact—for nothing but good to all parties concerned can come of it. Mr. J. G. Frost, the Chairman of the Company, in the course of an interesting speech proposing the adoption of the report, pointed out that as a result of the scheme there was an amount equivalent in cash to practically £1600 standing to the credit of the employees in the books of the Company, and that those who were young had thus a golden opportunity of laying up a substantial provision against adversity or old age. But, as he rightly remarked, the beneficial effect does not end here. Profit-sharing should—and, as is shown at Chester and other gas-works where it has been adopted, does—operate in the direction of urging the men to greater individual effort; the result of which is gain both to the employer and employed. The Chairman embodied in his remarks some excellent advice, of a homely, but wholesome, character, to the younger men and boys; and what he had to say will, it is to be hoped, where needed, be carefully considered, not only by those who heard it, but by those who may subsequently read it.

Municipal Sinking Funds.

There are some remarks of interest on the subject of municipal sinking funds to be found in a recently issued special report of the Select Committee on Local Legislation, who sat as two Committees during part of the session—meeting first about the middle of March. To this Committee were referred "all Private Bills promoted by municipal and other local authorities, by which it was proposed to create powers relating to police, sanitary, or other Local Government regulations in conflict with, deviation from, or excess of the provisions of the general law." In all, twelve Bills were considered by them. On the question of sinking funds, the Committee say that power was again sought to apply these funds in exercise of new borrowing powers. In granting this to Lisburn the Committee required an annual return to be made to the Local Government Board for Ireland, showing the sums applied under this power, and the securities in which such sums are invested. In so doing, they point out that they acted on recommendations of the Select Committee appointed to inquire into this matter. In the case of Oldham, the Committee found an unusual power had been given to the Corporation in 1886, enabling them to apply a portion of each sinking fund to maintain a balance at the bank. They thought it inadvisable to interfere with this power so far as regards existing loans; but they regarded it as inadvisable to extend it. The Committee instructed the Chairman (Sir Francis Layland-Barratt) to ask for a parliamentary return of the securities in which local authorities have invested their funds—distinguishing between investments of sinking funds and other corporation capital.

American Illuminating Engineering Society.

In accordance with the intimation given in the "JOURNAL" for the 31st of August, the third annual meeting of the above-named Society was held in the United Engineering Societies' Building, New York, from Monday to Wednesday last week, under the presidency of Mr. T. Cummerford Martin. The titles of most of the papers prepared for the meeting have already been given; but the following additional communications are contained in the complete programme which has since come to hand:—

"Work of Dr. Carl Auer von Welsbach in the Field of Artificial Illumination," by Mr. G. S. Barrows.

"Illuminating Engineering from the Educational Standpoint," by Mr. F. K. Richtmyer.

"Notes on the Chemical Luminescence of Rare Earths," by Dr. Angelo Simonini.

"The Light of the Firefly," by Drs. H. E. Ives and W. W. Coblentz.

"The Physiological Effects of Radiation," by Dr. Charles P. Steinmetz.

"Allowable Amplitudes and Frequencies of Voltage Fluctuations in Incandescent Lamp Work," by Mr. H. E. Ives.

"Standard Relations of Light Distribution," by Mr. A. J. Sweet.

In addition to the papers, reports were to be presented by the Sub-Committees on the Unit of Light and on Photometric Units. The general proceedings at the meeting, as well as the principal papers, will be noticed in subsequent issues of the "JOURNAL."

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 69.)

THE Stock Exchange had a more satisfactory time last week from the professional point of view. As soon as the settlement of the long account was concluded (not without one small failure), there was a marked increase in activity, bringing relief to all who were sick of a calm. This burst was to a great extent confined to good speculative lines. The more serious markets—such as Home Government securities—stood magnificently aloof, although Home Railways had a share in the cheerfulness. The week opened very quietly—the settlement being foremost in view; and the high-class departments were dullish. But Americans and South Africans began to look up. Tuesday was quite quiet, and disposed to be flat in several quarters; but Consols managed to pick up $\frac{1}{16}$. On Wednesday, Consols lost their little fractional gain; Railways were still doing poorly; and things in the speculative lines moved irregularly. Thursday brought some promise of improvement with signs of increasing business. Railways initiated a better tendency, which endured quite to the close; and in various other quarters there was a much brighter outlook. Activity increased on Friday, coupled with firmness in some important departments. Home Governments were not among these; but Railways were in better demand, and several popular speculative undertakings were on the rise. This general state of things was continued on Saturday; and the week had a cheerful termination. In the Money Market, there was a distinctly firmer tone. The demand for the Stock Exchange and for the end of the quarter was good; and discount rates were firm. Business in the Gas Market was a good average volume in the aggregate, but unevenly distributed; the two leading Metropolitan Companies monopolizing by far the larger part of it. The tendency continued very firm, and several further advances in quotation were made. In Gaslight and Coke, the ordinary was strong and active. After changing hands early on Monday at 105½, it left this figure behind, and mounted up to 106⅞ at the close—a rise of ¼. The secured issues were quiet and firm; the maximum marking 88½ and 89, the preference from 104 to 105, and the debenture 86¼ and 86½. South Metropolitan was in demand at the same figures as the week before (119½ to 120¾); and the quotation was put up a point. The debenture marked 86¼. In Commercials, the only business was a couple of deals in the 4 per cent. at 109½, and the quotation rose 1. Among the Suburban and Provincial group, Alliance and Dublin old was done at 19 (a rise of ½), Brighton ordinary at 150½, Brentford old at 254¾ (a rise of 1), West Ham ordinary at 125½, and ditto preference at 127½. Some other issues (not dealt in) had rises in their quotations. In the Continental companies, Imperial recovered a point, and marked from 179¾ to 180½. Union was done at from 95¼ to 96½, and Tuscan at 9⅞. Among the undertakings of the remoter world, Buenos Ayres changed hands at 14⅛, Melbourne 5 per cent. at 104¼ *cum div.*, Monte Video at 12⅞, Primitiva at 7⅛, ditto preference at from 5¼ to 5⅜, River Plate at 17, and South African at 13½ and 13¾.

ELECTRICITY SUPPLY MEMORANDA.

Tariffs and Difficulties—The Overcharged and the Undercharged—Electrical Socialism—Arc Lamp Position—The Metallic Filament Diverting Attention from the Arc—Absurd Claims—Pressures and Ignorance.

THE question of electricity tariffs has largely been on the shelf of late. It offered a fruitful field up to recent times in which electricians could exercise ingenuity, with the one result that highly technical systems of charging were evolved, and not attractive commercial ones. In their effects, the adopted systems have turned out to be, more or less, what has been described as "economic failures," for the simple and sufficient reasons that the public cannot understand them, and so cannot be got to put their trust in them. Just lately Mr. Seabrook has come out at Marylebone with his "telephone system" of charging, which was put forward as though it had an indisputable claim to perfect originality, and that there was no indebtedness to anyone else for the idea. The trumpetings of West Ham are being repeated at Marylebone. The wonderful Marylebone report on electrical tariff reform has had extensive notice in the technical and daily press. By such means are reputations made. But so far as we have seen, the noise made over the report has been greater outside Marylebone than inside; while the stimulus it has given to applications for electrical connections has not been of any corresponding or striking order. There is no doubt, however, that electricians have got to do something to compensate for the depressions caused in revenue by the metallic filament lamp. And the favourite idea appears to be to charge a definite sum based on the maximum demand of the consumer, with a small charge per unit for the electricity consumed; this being accompanied by an attempt to cultivate a larger business in cooking and heating. This system of charging has the advantage that it does overcome the difficulties of two rates, two meters, and two sets of wiring. But it has no other. In fact, the fixed charge is an objection to the less affluent class of consumers. But the idea that such a system will give an impetus to cooking and heating by electricity is being derided by experience at every turn. It is no small difficulty to get consumers to adopt cooking and heating by electricity—first cost, running cost, and efficiency are all opposed to the best efforts in this regard of the distribution or commercial man of the electricity supply undertaking We have heard his plaint. The electrical engineer urges the much harassed commercial man to push (let us say) the "Therol" water-heater for all it is worth; and he makes trial, is disheartened, and confesses to his intimates out of hearing of the engineer that it is useless. Consumers are staggered at the first cost, and the smallness of the supply of hot water for the great expenditure of current. And they want to know of the electrical commercial man "What he takes them for?" It is ludicrous to affect that a heater of the kind is an economical success. But this is all in line with the general pretence that is witnessed in the electrical industry, and with the amazing tariff schemes that have for their main object the delusion of the householder.

In an article by Mr. F. Fernie in the "Electrical Review" recently, there was, in the first part, what amounts to a bare-faced admission that the tariffs of electricity undertakings are so arranged that some people pay more than cost price, while others pay under cost price. If these undercharged consumers tend to improve the station-load factor then, it is argued, the overcharging of a proportion of the consumers would appear to be sound. That is to say, if you rob one person and hand the proceeds over to another person, there is an all-round benefit. This is electrical socialism; and we cannot defend it as being either sound or virtuous. However, "in this way," it is held, "the all-round cost per unit would be lowered;" so that the overcharged consumer "might eventually" be charged a lower rate per unit than the original cost of supplying him. We like the latent potentiality in the words "might eventually." If, in the general run of electricity undertakings, there is one class of consumer that obtains less consideration than any other, it is the lighting or overcharged consumer. He is the burden-bearer of the electricity undertaking. He is the last to receive consideration; the first to be menaced with an increase of his lighting rates if he adopts more economical lighting appliances. What it all comes to is that the electricity undertaking managers have to descend from the altitudes of their fanciful, mystifying tariffs, to something that, in this matter of charges, is plain, practical, and commercial. But the difficulty is for these managers to dissuade themselves that electricity supply for lighting, power, &c., is not something that is above the application of ordinary commercial practices. The peculiarity is that the new-fangled principles of charging in this branch of electricity supply is not applied to the conveyance of passengers by electric tramcars or electric trains, or to the sending of telegrams. If we are not greatly mistaken, the time will come when the aged practices of charging in trading will have to be applied to electricity supply as they are, practically universally, to other commodities and conveniences.

Not much has been heard lately of electric arc lamps. They seem to have dropped out of discussion; the cause being the concentration of attention on the metallic filament lamp. Arc lamps have never properly got over their congenital complaints; and every improvement in any direction that has been made in them has been effected at the sacrifice of something or other in another direction. This is clearly, though perhaps not intentionally, shown by Dr. Monasch in a German contemporary. Up to 1895, open arc lamps held the field; but even now some people prefer them because of the absence of injurious vapours and the whiteness of the light. Then 1895 saw the advent of the enclosed long-burning arcs. But the consumption rose to about 1 watt per hemispherical candle power. An advantage was that "the direction of the maximum light emission was favourable to uniformity in street lighting." They did not, nor do they now, make any profound impression upon us in respect of uniform distribution. There are examples of these lamps in London at present for which high prices are drawn from the pockets of the ratepayers. We will examine them again at an early date to see if our views as to light concentration and not light diffusion should undergo some change. There is no desire on our part to harbour unworthy thoughts even over an arc lamp. Another disadvantage is that the inner globe got densely coated after (say) 200 hours; and this, with the dusty appearance of the outside, led to the intermediate type of lamp, which, although enclosed, is fitted with thin carbons. These, in turn, burn for about 22 hours only. Then we come to the Bremer lamp of 1900. Some of the early troubles of this form of lamp are still with us. In the later forms, there has to be suitable ventilation of the globes to "minimize" the harmful effect of the white deposit given off by the carbons, both as regards the mechanism and the obscuring of the globes. There is nearly a 5 per cent. reduction of the light from this cause after burning only eighteen hours. Then trouble with the regulating mechanism in flame arc lamps led to the design of lamps without such mechanism; but these fell short of the "quality" of those with mechanism. Then there came the Carbone lamp, about which a great deal was heard—temporarily. Upon the Blondel lamp, Dr. Monasch confers honour both for uniformity and consumption. Some of our British firms consider their productions quite as good, judging from their advertisements. This brief reference to the learned Doctor's historical account of the forward movement in arc lamps shows that it has been a besetting sin of this type of electrics that they could not grow in grace in one direction without losing virtue in another.

In a recent issue of the "Electrical Review," there is a spirited

defence, by "Pam," of the enclosed arc lamp against the metallic filament lamp. There is no question that the business in arc lamps has felt a bit of a draught through the coming of metallic filaments. In the experience of the writer, he knows of several shopkeepers who have, without regret, abandoned arcs for clusters of metallic filaments. It is quite true, as "Pam" says, that arc lamps want a good deal more selling than most things. But the uncomfortable time Osrams and their fellow-filaments have given arcs, we do not believe is on account of any greater lighting efficiency, but because the metallic filament lamps do not require trimming, and, in appearance, are far and away more attractive than the enclosed arc lamps. But "Pam" thinks the changing preference is due more to the apathy of manufacturers and those interested in arc lamps generally; and he asserts, with a boastful air, that they have enough fighting material at hand to swamp all the adherents of other artificial illuminants if they could only muster enough energy and intelligence to put things plainly before the general (electrical) public. The last few words are very nasty. The statement is either a slander, or it is not. If it is not, then the arc-lamp makers have not that swamping fighting material of which friend "Pam" brags. These vain pretensions are completely knocked on the head by the results of trading; and there would have been no occasion for saying that arc lamps want more selling than the usual run of things if the extraordinary merit hinted at was really at the back of the lamps. That merit would alone act as a propelling force of a no mean order.

But "Pam" has come across people who think that arc lamps are not as efficient as metallic filament lamps; and this he asserts is a direct result of unintelligent advertisement. Then he cries "if the arc people would only give a few details as to what they actually can do in regard to candle power for carbon and watt consumption!" We have found that they do give figures—not of what they "actually can do," but of what they actually cannot do. "Pam" himself relates how a certain firm sent inquiries to several dealers for flame arc lamps for shop lighting. "The current was specified as 10 amperes, the voltage 200, and the lamps were to run four in series; and tenderers were requested to state the mean hemispherical candle-power of the lamps offered. Now one firm actually gave this as 4000, and another as 3000. This, mark you, for an expenditure of only 500 watts, which shows 8-candle power per watt!" And these firms do not stand alone in this particular form of sinning. The absurdity of a 1000-candle power difference in the quoted candle power, the absurdity of any such claim as 8 candles per watt can, and must do, as indignant "Pam" says, a lot of harm. But in proof of his assertion that the enclosed arc lamp is cheaper than metallic filament lamps, he takes the case of an ordinary shop, using four lights for either inside or outside lighting, and assumes that it is desired each lamp should give about 600-candle power; the voltage being 200, and the charge for current 5d. per unit. In the case of metallic-filament lamps, a life of 1000 hours has been allowed, although "700 to 800 would be nearer the average." The result of the calculation on the hypothetical case is as follows:

Enclosed Arc Lamps.	Cost per Annum
Four lamps complete at £2 10s. each = £10; 20 per cent.	£2 0 0
Trimming and carbon, ten visits at 4s.	2 0 0
Energy, 600 watts × 1000 hours × 5d. per unit	12 10 0
	£16 10 0
Metal Filament Lamps.	
Four lamps, depreciation on lanterns, &c., say 25s. each	£5 0 0
Energy, 800 watts × 1000 hours × 5d. per unit	16 13 4
	£21 13 4

The enclosed arcs, on the price basis taken, certainly come out the cheaper. But enough of this, or we shall have gas managers' mouths watering for business on the basis of the supply of light equal to 600 candles for 1000 hours at £21 13s. 4d. and £16 10s. A cheque for £3 would pay for the 24,000 cubic feet, at 2s. 6d., required in the 1000 hours for the light of 600 candles, using inverted gas-lamps at ordinary pressure.

"The consumer purchases a mantle which, when brand new, supplied with suitable fittings, and burnt at a given pressure, affords the advertised candle power. It is adjusted by the company's gas expert at six o'clock in the evening and burns silently; at ten or eleven o'clock the same night it acquires an asthmatic roar; blue flame flits round the top of the microbe crematorium, the light wobbles, much candle power seems to have gone off duty for the night." "Meteor" of the "Electrical Times," writing on the subject of gas pressures, wants to know what we have to say to this. Our reply is "nothing," except that what he has written is very silly, that he would not find truth any more expensive than the opposite quality, and that it is time he was informed that, owing to the day gas-load having reached from 30 to 50 per cent. of the twenty-four hours' output, gas pressures are kept more uniform now than they were in the days of flat-flame lighting and the Victorian days of incandescent gas lighting.

The death occurred on the 24th ult., at "Larchfield," Barkston Ash, Yorkshire, of Maud Emily Dalcho, youngest daughter of the late Mr. William John Warner, for many years Engineer and Manager of the South Shields Gas Company.

PRESENTATIONS TO MR. AND MRS. DOIG GIBB.

Last Wednesday evening, further proof was furnished of the respect and esteem which Mr. W. Doig Gibb has won during his tenure of the position of Chief Engineer of the Newcastle and Gateshead Gas Company, by the presentation to him, at a large gathering of the officials and workmen at the Elswick Works Rifle Range, of a solid silver centre-piece, which was accompanied by a silver afternoon tea service for Mrs. Gibb, and a gold pendant for each of their two sons. Mr. Thomas Hardie, the new Chief Engineer, presided.

The presentation was made by Mr. G. L. Swallow, the Manager of the Elswick Gas-Works, who said the company had assembled to ask Mr. Gibb, their Chief Engineer, to accept, on behalf of himself, Mrs. Gibb, and their family, some tokens of esteem and regard from the officials and workmen at the Elswick and Redheugh Gas-Works, on the occasion of his leaving to take the responsible position of Chief Engineer to the South Metropolitan Gas Company—a Company with historic traditions. They all regretted that he was leaving them; but they not less sincerely rejoiced at his promotion to so important a post, which he was eminently qualified to fill. They felt it was a great honour that the Metropolis of the North should supply the necessary talent and ability to the great Metropolis of the South. During the many years they had known Mr. Gibb, his ability, integrity of character, and unfailing courtesy had impressed and influenced them more and more. Intimacy with him had but revealed deeper wells of kindliness and genuine consideration for subordinates and equals alike; while regard for his ability, no less than his other personal qualities, had been shared by them in common with the gas industry generally. But there were many traits in his character and kindly nature which were best known to those then assembled, with whom he had been closely associated. His frankness and unreserved trust in his dealings with all had resulted in the very best efforts being drawn out of those around him. His high ideals of duty, his thoroughness, his sincerity, and his straightforward character, had impregnated all with whom he had come in contact. He had taken a kindly interest in their personal affairs, had sympathized with them in their trouble, and rejoiced in their success and happiness. Mr. Swallow concluded by wishing Mr. Gibb "God-speed" in his new sphere of labour, and, on behalf of the subscribers to the testimonials, from the heads of the works down to the smallest boy, by expressing the hope that he and his family might have long life, health, and prosperity.

Several other officials also testified to the high character of Mr. Gibb, congratulated him on his appointment, but regretted his departure from Newcastle; the Chairman associating himself with the remarks which had fallen from the previous speakers.

In returning thanks, Mr. Gibb, who was very cordially received, said he was going to take up very responsible duties, and the knowledge that he had the good wishes of those who had assembled that evening would certainly encourage him to do his best. If he had succeeded, as he thought he had, in winning their affection and esteem, it was perhaps in the first place because, however imperfectly, he had always tried to follow up one simple little doctrine in which he believed with all his heart—to do to others what you would others should do to you. As they knew, he was going to a Company where co-partnership was carried out. He was a very firm believer in this, and he was not without hope that something of the kind might come to Newcastle some day. If ever it did come, it would be much easier than in some other places, because the first step had already been taken in the co-partnership existing between the men and the officials of the Company. He concluded by heartily recommending his successor.

Last Friday evening, in the distribution department of the Company in South Street, Newcastle, a presentation was made to Mr. Gibb by the employees of the department. It took the form of a handsome silver salver, suitably inscribed; and it was presented by Mr. John Lewis, the Superintendent, who presided. In asking Mr. Gibb to accept the gift, he extended to him the hearty congratulations of the employees on his new appointment, and expressed their regret at his departure from Newcastle. Mr. Malcolm Nichol, the oldest employee, spoke on behalf of the men, and assured Mr. Gibb of their high esteem. Mr. Gibb, in returning thanks, alluded to the value of the gift, and said it would be the best testimonial he could possibly have had to take to the workmen of the South Metropolitan Gas Company, to show them that he was not so bad as they might expect him to be. Alluding to a remark of one of the speakers, he said he had gone through the shops, not as a premium apprentice, but as a working one, and had learned to esteem his fellow-workmen then and since. He had always felt that so long as a man or a boy was doing his work to the best of his skill, fairly, straightly, and honestly, he was as much entitled to one's respect as any other man who happened to be in a better position. The same evening, Mr. Gibb was presented with a testimonial by the Grainger Street staff of the Company; Mr. Waddom, the Secretary, making the presentation.

The Rev. C. K. Robinson, D.D., Master of St. Catharine's College, Cambridge, and for many years a Director of the Cambridge Water Company, left estate of the gross value of £18,750.

THE LATE SIR GEORGE LIVESEY.

Workmen's Memorial Services.

On the 4th of October last year, the gas industry in general, and the South Metropolitan Gas Company in particular, sustained an irreparable loss by the death of Sir George Livesey. Yesterday, therefore, was the anniversary of the sad event; and it was only to be expected that fitting notice should be taken of it by those who had special reasons for cherishing the memory of their far-seeing and large-hearted benefactor. Accordingly, at the unanimous request of the workmen's section of the Co-Partnership Committee of the Company, arrangements were made for holding a memorial service, to which the employees and their wives and families were invited, yesterday evening, in Christ Church, Old Kent Road, the Vicar of which (Rev. Frank Hobson) readily consented to its use for the purpose. Possibly a more appropriate building could not have been selected; for it is not only closely associated with the works with which Sir George had a lifelong connection, but it was always an object of interest to him, as testified by his liberal contributions to its funds. It may not be uninteresting to reproduce, from the Company's "Co-Partnership Journal" for December last, a few particulars in regard to this church. Its predecessor, built in 1838, stood on ground which is now occupied by a portion of one of the retort-houses. An extension of the works being called for, the church, after an existence of thirty years, was demolished, and the one in the Old Kent Road erected to replace it. The removal was as necessary for the comfort of the worshippers as it was for the purposes of the Company; as the contiguity of the works to the sacred building was by no means agreeable. The new church was consecrated in 1868. Yesterday evening it contained a very large congregation when the memorial service was opened by the singing of the hymn, "Jesu, Lover of my Soul." Then followed prayers and a lesson from Rev. vii., 9; after which came the hymn, "How Bright those Glorious Spirits Shine," which was followed by an address by Canon Ransford, who conducted the funeral service at Nunhead Cemetery. Taking the words "This do in remembrance of Me," he directed his hearers' attention specially to the religious side of Sir George Livesey's life. At the close of the address the hymn "Now the Labourer's Task is O'er" was sung; and then the Apostles' Creed was repeated, and portions of the Burial Service and a few collects were read by the Vicar, who briefly addressed the congregation. The concluding hymn was "Abide with Me;" and the Benediction brought the impressive service to a close. Before it commenced, the organist played Mendelssohn's "O Rest in the Lord;" and at the end Spohr's "Blest are the Departed." On the previous afternoon, a service for workmen was conducted at the Vauxhall Institute by the Rev. Richard Dixon, Vicar of St. Michael's, Stockwell.

Yesterday afternoon, members of the Co-Partnership Committee, on behalf of the employees, placed a wreath on Sir George Livesey's grave in Nunhead Cemetery.

In the newspapers last week, statutory notices were given by Messrs. Hicklin, Washington, and Pasmore, the Solicitors for the Executors (Messrs. Frank Bush and Harry Hawes Keddell), that all claims upon the estates of Sir George and Lady Livesey are to be sent in writing to them on or before the 25th inst., after which date they will proceed to distribute the assets of the estates among the persons entitled thereto.

Obituary.—The death has occurred, under distressing circumstances, of Alderman W. A. Massey, J.P., of Hull. Deceased had not been in good health for two years, and on this account had had to relinquish his position as principal of the firm of Messrs. Massey and Co., and give up his important public work. He was returning from Folkestone, where he had been staying for two or three months, and died on the journey. He negotiated the purchase of the Kingston Gas-Works for £90,000, and made a working agreement with the British Gaslight Company to supply gas to the old part of the city (within the docks) at a cheap rate, equal to a reduction of 2d. per 1000 cubic feet on the previous charge.

Successful Artesian Boring at Slough.—For nearly three years, Messrs. Horlick have been drilling for a good water supply at their Slough works; and after going down 1100 feet, they have been successful to an extent almost beyond their expectations. Last Thursday morning, the search culminated in an unprecedented manner, for without warning water rushed up with tremendous force, putting the pumps and machinery out of action, and flooding the ground adjoining the works. A quantity of fine sand came up with the first rush; but when the flow had become clear, an examination took place, and this proved that the water is likely to be the clearest and purest in the district. The pressure fluctuates every twelve hours; and this leads to the idea that the underground springs are affected by ocean tides. After getting through the surface and a depth of silting sand, the operators continued drilling through 700 to 800 feet of chalk. They then came upon hard clay soil; and it was not until they had gone nearly 300 feet through this that they came into sand. As soon as the clay had been removed, the water began to make itself evident. The boring is 18 inches in diameter at the surface and 6 inches at the bottom; while the estimated yield is between 30,000 and 40,000 gallons per hour. The work has been carried out by Messrs. Isler and Co., of Southwark, under the supervision of Mr. A. G. Christiansen, Messrs. Horlick's Engineer.

GAS ACTS FOR 1909.

[Third Article.]

In continuing the review of the Acts of Statutory Companies passed in the current session of Parliament, we find there are six more in this class requiring notice.

The Harrogate Gas Company have obtained the desired extension of their limits of supply; but the clause has been removed by which sanction was asked to the acquisition of certain small private gas plant in the parish of Birstwith. Power has been secured to construct a railway (1 mile 5 furlongs 8·5 chains long), commencing at the Bilton Junction sidings on the North-Eastern Railway, and terminating in the coal-store on the Company's works. The construction of subways and necessary works subsidiary to this railway are authorized, together with the acquisition of certain lands and easements. Arrangements are legalized between the Company and the Corporation, whereby the former may, as a matter of business, undertake the delivery over the new railway of coal required by the electricity works. New clauses appear for the protection of public rights in connection with the railway. The North-Eastern Railway Company have also obtained protection in a number of respects; but they are not "in any way to interfere with the works of the [Gas] Company until they shall have made all such arrangements as the Company may reasonably require for preventing any loss of gas, or any interruption in the supply of gas." In connection with the railway, the West Riding County Council are likewise protected; and since the promotion of the Bill, they have obtained an extension of protection in respect of the laying of pipes. Power is given for the purchase of scheduled lands (comprising 1 acre 2 roods 29 perches) upon which to manufacture and store gas and residual products. The auction clauses of the Company's Order of 1897 are amended in manner to give the Company greater liberty in the issue of stock, after it has first been submitted to sale by auction or tender—the Company's employees and consumers of gas being linked up with the holders of ordinary and preference stock in having new issues offered to them. The creation of a special purposes fund is authorized; and superannuation and other allowances to officers and employees generally are provided for. The Directors have also power granted to them for subscribing to hospitals, &c. The clause giving power to the Company to provide and work independent installations of gas plant has been altered, so that it now reads as follows:—

> The Company may, at the request of the owner or occupier of any premises within the limits of supply which cannot conveniently, or without undue expense, be supplied from any existing main for the supply of gas from their authorized gas-works, provide, and fix upon such premises upon, and subject to, such terms and conditions as to payment and otherwise as may be agreed between the Company and such owner or occupier, engines, motors, dynamos, generating and other apparatus, stoves, ranges, pipes, fittings, and appliances necessary or convenient for the purposes of the generation, supply, use, or consumption upon such premises of acetylene, gasolene, or suction gas, or any other gas, and may enter into, and carry into effect, contracts or agreements with any such owner or occupier as aforesaid for the working and use of any such engines, motors, dynamos, generating, and other apparatus: Provided that nothing in this section shall exempt the Company from any indictment, action, or other proceeding, for nuisance in the event of any nuisance being caused, or permitted by them, upon any such premises as aforesaid.

The new business authorized by this section is to come under the ordinary controlling power-gas clauses. The explanatory clause that appeared in the Bill regarding the charge for gas used for public lighting has been deleted; so that the clause in the Company's Act of 1863 regulating the supply and price of gas to the public lamps will still define unamended "the lowest price charged, for the time being, by the Company to any private consumer." Three succeeding clauses are of sufficient interest to quote *in extenso*:

> Notwithstanding anything contained in section 66 (Company to Supply Gas in Certain Events at Request of Owner or Occupier) of the Act of 1863, it shall be lawful for the Company, in any case in which they may think fit so to do, to provide, at their own expense, the whole, or any part of so much, of any service-pipe as shall be laid upon private property, or as shall be laid beyond 30 feet in length.
>
> Section 41 (Power to Refuse to Supply to Persons in Debt for Other Property) of the Order of 1897 is hereby repealed; and in lieu thereof the following provisions shall have effect: If a person requiring a supply of gas from the Company has previously quitted premises at which gas was supplied to him by them without paying to them all gas or meter rent due from him to the Company, and all moneys so due in respect of the supply or letting on hire to him by the Company of engines, motors, dynamos, stoves, ranges, pipes, fittings, apparatus, or appliances, the Company may refuse to furnish to him a supply of gas until he pays the same.
>
> Notwithstanding anything contained in any enactment to the contrary, the Company shall not be obliged to give from any main a supply of gas for any purpose other than lighting in any case where the capacity of such main is insufficient for such purpose; or if, and so long as, any such supply would, in the opinion of the Company, interfere with the sufficiency of the gas required to be supplied by means of such main for lighting purposes.

There is nothing special about the remaining clauses. [*Parliamentary Agents: Messrs. Dyson and Co.*]

The Heckmondwike and Liversedge Gas Act gives the Company power to acquire certain lands for the manufacture and

storage of gas and residual products; but upon part of it, in protection of a private property owner, they are limited to the storage of gas. For £2407 10s., the Company are allowed to purchase the mains, pipes, and other works of the Mirfield Gas Company in the ecclesiastical parish of All Saints, Roberttown, in the township of Liversedge; the rights of the Mirfield Company ceasing on the completion of the purchase. Clauses protecting the Bradford Corporation and the Lancashire and Yorkshire and the London and North-Western Railway Companies have been introduced. Power is accorded in regard to the conversion of the capital on a 5 per cent. basis. Additional capital to the amount of £60,000 has been granted, to which the new auction clause will apply. Borrowing powers are allowed in respect of the converted capital to the amount (including £13,500 already borrowed) of £21,000; and the additional capital will carry the right up to one-third the issued amount. The Board have secured the following powers:

The Directors of the Company may, at their discretion, appoint, suspend, remove, or dismiss such managers, treasurers, secretaries, engineers, collectors, clerks, agents, and servants, as they from time to time may think proper for the better carrying on of the business of the Company, and may determine their respective salaries, wages, commissions, or other emoluments, and may require security from all or any of such officers, clerks, or servants, to such amount as they may think fit. The provisions of sections 110 to 114 inclusive of the Companies' Clauses Consolidation Act, 1845, shall apply to all such officers, clerks, and servants, and to their duties and accounts.

The clause that stood in the Bill giving the Directors discretion in regard to the inspection, &c., of the list of shareholders, has been expunged. Power is given for the creation of special purposes and reserve funds. The carry-forward of profits is limited to the equivalent of a year's dividend. The standard price mentioned in the Bill has receded by 3d. to 3s.; and the sliding-scale is to apply on the basis of penny changes in price varying the dividend by 2s. 6d. per cent. The standard illuminating power of the gas is to be 14 candles, tested by the Carpenter "Metropolitan" No. 2 burner. The "power" gas clauses that were in the Bill as introduced have been removed. The name of the Company has been changed from the Heckmondwike Gas Company to the Heckmondwike and Liversedge Gas Company. A suspensory clause appears in the Act in favour of the Heckmondwike and Liversedge District Councils, in the event of their moving for purchase powers next session; but this clause nor the present Act does not prejudge or prejudice the question of purchase. [*Parliamentary Agents: Messrs. Sherwood and Co.*]

The Leyland Gas Company is the title by which the Leyland and Farington Gas Company will in future be known; the change having been confirmed by their Act. The limits of supply will in future embrace the two parishes of Eccleston and Heskin in the county of Lancaster. Included in the Act are clauses for the protection of the Lancashire and Yorkshire and the London and North-Western Railway Companies. The additional capital powers asked for in the Bill have been granted—viz., £5000; but, as requested, this will only carry one-fourth borrowing powers. The new auction clauses will apply to the issue of this additional capital. The creation of special purposes and reserve funds is allowed. The now common restriction as to the carry-forward of profits being only equal to a year's dividend is inserted. With a standard rate of dividend, and a standard price of 3s. 10d., the sliding-scale will operate yearly by variations of 2s. 6d. per cent. in dividend by changes in price of a penny. In the Bill the standard price was placed at 4s., with the sliding-scale operating half-yearly on the usual terms; so that there have been modifications in these respects. The standard quality of the gas mentioned in the Bill was 14 candles. This has gone up by 1 candle; and the determination of the quality is to be by the aid of the "Metropolitan" No. 2 burner. The proposed power in the Bill to supply Mond gas or any of its developments has been extirpated. [*Parliamentary Agents: Messrs. Sherwood & Co.*]

A large part of the Pontypool Gas and Water Act refers to the water undertaking of the Company; and the provisions will be duly noticed in the review of the Water Acts. In the section devoted to the gas undertaking, it is ordained that the standard illuminating power shall be 14 candles, tested by the "Metropolitan" No. 2 burner. Powers are conferred to compulsorily purchase additional lands adjoining the present gas-works for both manufacturing and storage purposes. The old 10 and 15 per cent. discounts clause has been adopted. The prepayment meter clause has been varied in one small particular: "If no fittings are supplied with the prepayment meter, the maximum charge for the hire of such meter shall not exceed 7d. per 1000 cubic feet of gas supplied in manner aforesaid, or 10 per cent. per annum on the cost of the meter, whichever shall be the highest." Of £75,000 of additional capital authorized, a sum of £10,000 is allocated to the gas undertaking; the remainder to the water concern. The ordinary additional capital is to be entitled to a dividend at the rate of 7 per cent.; and the preference capital to not exceeding 6 per cent. The borrowing powers may equal one-third of the capital raised. In issuing the additional capital, the new auction clauses apply. [*Parliamentary Agents: Messrs. Rees and Freres.*]

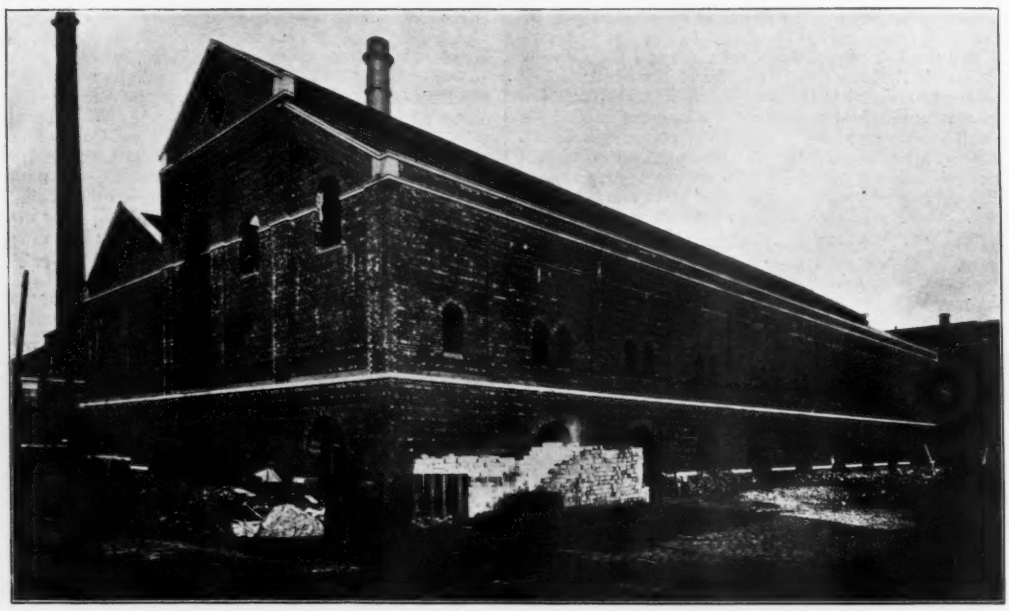
Quite a large number of now ordinary powers appear in the Wells Gas Company's Act. Those particularly referring to the Company include the conversion of the preference shares into one class of preference stock to the amount of £5000, bearing a rate of interest of 5 per cent. per annum. The ordinary shares are also to be converted and consolidated into one class of stock. Confirmation has been given to the application for additional capital powers to the amount of £15,000, half only of which may be issued as preference stock. In the issue of the additional capital, the new auction clause will operate. Regarding borrowing powers, the Company may borrow (inclusive of the £3300 already borrowed) £6666; and one-third on the additional capital. Dividend on the ordinary consolidated stock is not to exceed 5 per cent. A special purposes fund may be formed. A standard illuminating power of 14 candles is prescribed, as tested by the "Metropolitan" No. 2 burner. The ordinary form of prepayment clause has been adopted; and the Company are granted power to apply for an Electric Lighting Order if they think fit. [*Parliamentary Agents: Messrs. Martin and Co.*]

In the Yorktown and Blackwater Gas (Electric Lighting, &c.) Act, the limits of gas supply are extended; but nothing in the section is to prejudicially affect the right of the War Department to manufacture gas for the purposes of their own property. So much of the Order of 1877, the Order of 1890, and the Act of 1896, as authorizes the Aldershot Company to supply gas within the part of Frimley specified in the Act are repealed. The Company are, if required, to supply gas in bulk at the gas-works in Sandhurst of the Secretary of State for War for use on his property within the limits of the Company, at a price not exceeding four-sevenths of the price charged to the ordinary consumers, and not exceeding 2s. per 1000 cubic feet when the price to the ordinary consumers exceeds 3s. 6d. Protection is accorded to the London and South-Western Railway Company, the South-Eastern and Chatham Railway Company, and the South-Eastern and Chatham Railway Company's Managing Committee. In regard to the supply of gas to Wokingham, the Company have the pipes defined that they are to compulsorily lay. The pipe distinguished as No. 1 is to be completed within eighteen months of the passing of the Act, and the other pipes within two years. The Company have secured electricity supply powers in so much of Frimley as is comprised in their gas-supply limits, and so much of Hawley-with-Minley and Yateley as is comprised within the gas limits, together with the parishes of Sandhurst, Crowthorne, Finchampstead, and Wokingham Without. But the Company are not to be entitled to supply electricity within any part of Frimley unless either the District Council shall have given their consent, or a period of one year has elapsed from the passing of the Act without the Council having applied for electricity powers. The Surrey County Council have obtained the insertion of certain protective clauses. Lands are scheduled (now held for purposes of the gas undertaking) for a generating-station. To the clause giving power to effect agreements for the supply of energy to any Government department, local authority, company, or person, there is a proviso that the Company are not to exercise the powers within the authorized area of supply of the Aldershot Company without their previous consent. All the ordinary powers referring to the supply of electricity are conferred; but the overhead wires clause that appeared in the Bill has been deleted. Powers are given to local authorities to purchase so much of the electricity undertaking as is in their respective districts, upon giving six months' notice in writing, at the expiration of 21, 28, or 35 years from the passing of the Act. The clause referring to the change of the title of the Company has been expunged. Additional capital powers to the amount of £50,000 are granted; and to this the new auction clause applies. Borrowing powers to the extent of one-third the issued capital are allowed. A special purposes fund may be created; but the renewal fund proposal has gone. It is ordered that separate accounts are to be kept of the gas and electricity undertakings. It is also provided that, whenever the revenue of the electricity undertaking exceeds the sum-total of the expenditure (including any payments to the special purposes fund), and of a sum equal to 7 per cent. on the capital, the Company shall make such rateable reduction in the charges for electrical energy as, in their judgment, will reduce the surplus to the maximum rate of profit. Protection is given to the Berkshire County Council. [*Parliamentary Agents: Messrs. Hargreaves and Crowthers.*]

Estimation of Water in Tar.—In a recent number of the "Chemiker Zeitung," Herr H. Beck described a new apparatus for the estimation of water in tar. According to an abstract translation of the article in the "Chemical Trade Journal," the object of the apparatus is to reduce the time and attention required for this estimation by older methods. The author makes use of the usual 2-litre metal flask; but, instead of distilling from this a litre of tar, or, in the case of tars of high water content, a tar mixed with its own bulk of dry oil, he works on a much smaller sample as follows: The still is charged with 500 c.c. of anhydrous tar or tar oil, and heated up to 250-270° C. On to this hot oil, 200 c.c. of the sample is run drop by drop or in a thin stream, according as it contains much or little water. As each drop falls, a slight explosion results; but once a convenient rate of addition has been found, the apparatus may be left to itself until all the tar has been added. The temperature is then raised to 300° C., and in from 20 to 35 minutes, according to the moisture content of the tar, all the water will have been collected in the receiver, which, with the condenser and a dropping apparatus, constitutes the whole equipment. The method described saves a three or four hours' distillation of a material which, especially when very wet, is inclined to bump and froth, and demand much attention. A series of experiments is recorded, which shows the method to be accurate as well as quick.

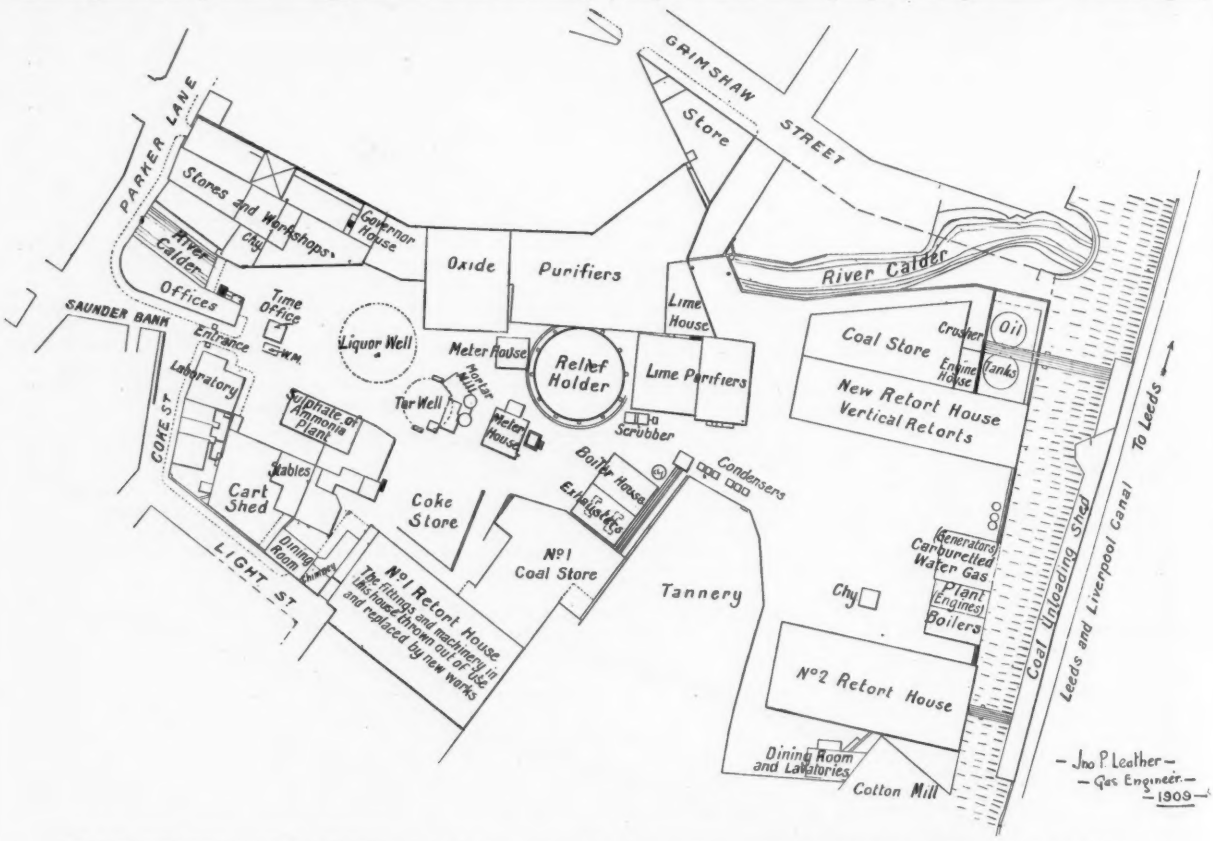
CONTINUOUS CARBONIZATION AT BURNLEY.

The Woodall-Duckham Vertical Retort System—West's Coal-Storage Plant.



View of the Retort-House from the South-West.

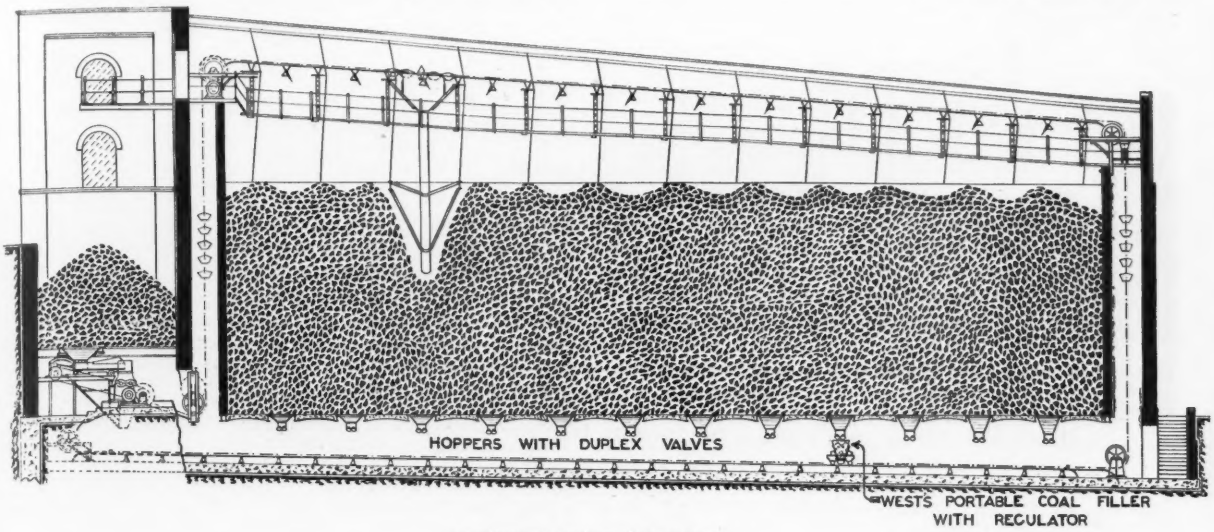
SOME four or five years ago, it was apparent to Mr. J. P. Leather, the Engineer and Manager of the Burnley Corporation Gas-Works, that the time was not far distant when serious consideration would have to be given to the provision of additional carbonizing plant and to the final abandonment of one of the retort-houses containing direct-fired settings, which were used as a sort of stand-by to the inclined retort-settings in another house. Mention of this reminds us that, in its gas manufacturing record, Burnley has been progressive. The Corporation Gas Committee, advised by their Engineer, were pioneers among gas authorities in this country in adopting inclined retorts; and they were the very first to determine to make a large installation of the Woodall-Duckham continuous system of carbonization, although Kensal Green and Burnley are running almost a neck-to-neck race in the matter of the completion of the settings on this system. But this is anticipating in our story the course of events. We were saying that Mr. Leather has been considering for some time the question of carbonization extensions and changes. Turning up a report of 1905 by him, it is seen that then, acting on instructions by his Committee, he made a report on the capacity of the plant under his care, and on its relationship to immediate and prospective requirements. In that report,



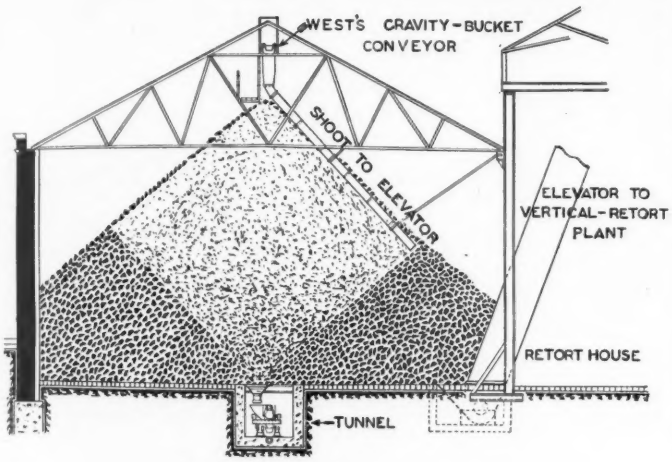
PLAN SHOWING THE GENERAL ARRANGEMENT OF THE BURNLEY CORPORATION GAS-WORKS.

[It will be noticed that there are no Gasholders at these Works, beyond the one used as a Relief Holder for the Carburetted Water-Gas Plant. The Holders for Storage are about Half-a-Mile away; all the Gas being sent to them as made, and distributed from the Storage Station.]

there is a table showing that year by year the undertaking had been expanding its business, and that the maximum day's demand had grown considerably. The table dealt with a period of twelve years. In the year ending on March 31, 1894, the make of gas was 406,017,000 cubic feet; and the maximum day's make 2,500,000 cubic feet. In the year to March 31, 1905, the annual make was 589,997,000 cubic feet; and the maximum day's make, 3,241,000 cubic feet. These are considerable increases; representing 29·6 per cent. in the maximum daily consumption of gas, and 45·3 per cent. in the annual make. In the succeeding four years, the demand on the works was progressive in volume, until, in the year ending March 31 last, the make of gas was 672,095,000 cubic feet, while the maximum day's consumption was 3,489,000 cubic feet. This expansion of business is not surprising, when it is learned that Burnley enjoys a supply of gas at 2s. 3d. per 1000 cubic feet for lighting purposes, and at 1s. 7d. for power, both less 5 per cent. The figures as to output are the proofs of the correctness of Mr. Leather's diagnosis of the position of the manufacturing plant four years before, and of his predictions that plans would soon have to be formed for new carbonizing plant.

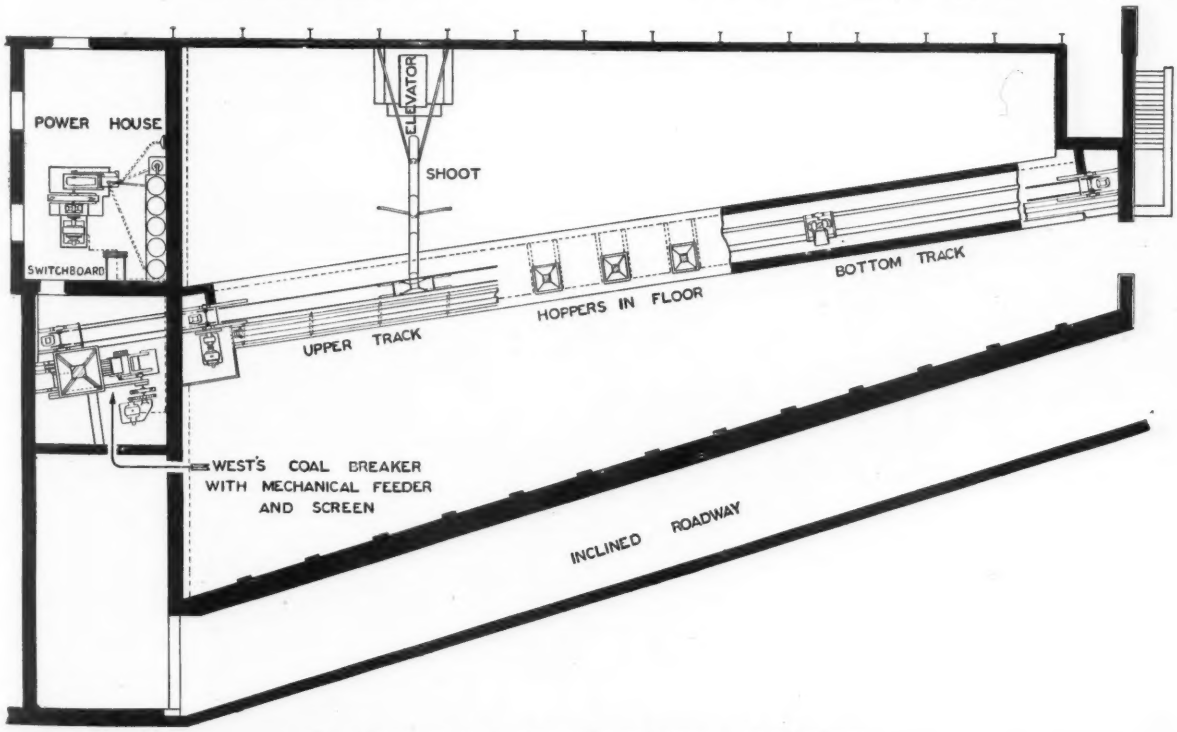


Longitudinal Section of Coal-Store.

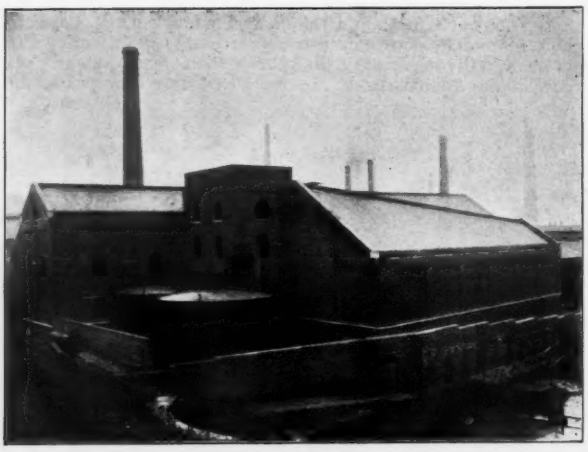


Cross Section of Coal-Store.

For some time past the old uneconomical direct-fired retort-house has but rarely been used; there having been dependence on inclined retorts and carburetted water-gas plant. The inclined retort-house contains 156 retorts, 15 ft. long by 24½ in. by 16 in.; and, regarding the productive capacity of it, as much as 2 million cubic feet per day have been made from the installation. But normal working is not quite up to this level. In due course, however, the time arrived when it was seen that reliance on existing conditions could not be continued indefinitely; and so the Gas Committee confirmed their Engineer in deciding to clear away the old



Plan of Coal-Store, Showing Tunnel for the Bottom Track of Conveyor.



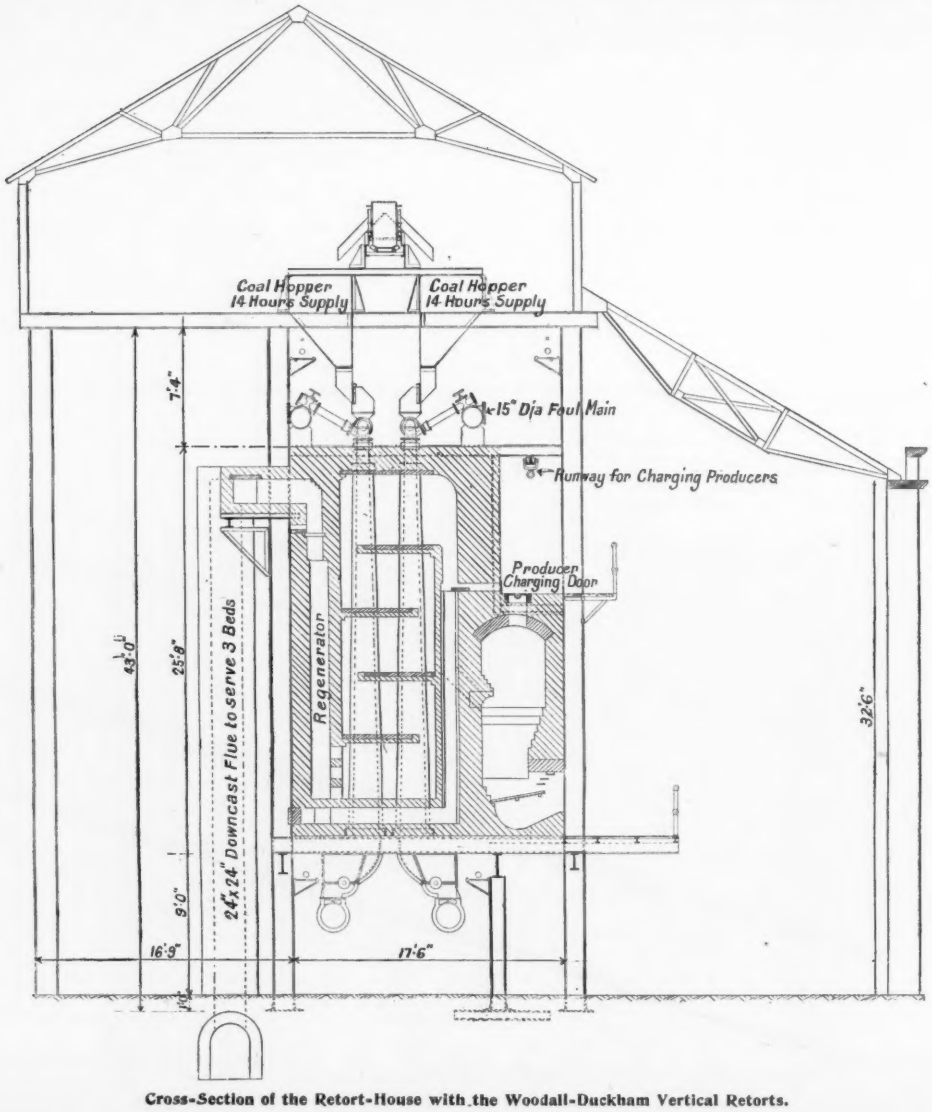
Back of Retort-House and Coal-Stores—From the Canal Embankment.

No. 1 retort-house and to build a large new retort-house with spacious coal-store adjoining on another part of the gas-works site.

The New Retort-House and Coal-Store.

Erected together, the new retort-house and coal-store are handsome buildings, and an imposing feature of the works. They were built from Mr. Leather's plans, by direct labour; and the design is such that it gave absolute freedom in the choice of the carbonizing plant to be installed. At the time the plans were made, and the construction of the buildings had been commenced, the position of affairs was changing in connection with carbonization; and there was a natural desire to be on the safe side while erecting the new buildings, so that any form of plant could be subsequently introduced. There was wisdom in this; for now that the die has been cast in the matter of system, and the first retort-bench is nearing completion, it is seen that the house which would have afforded comfortable habitation to an inclined bench gives with the verticals abundant freedom for movement and for any work that may hereafter be required in the house, and likewise the spare space adds greatly to the ventilation of the building, and to the making of the conditions of the workers all that could be desired.

The retort-houses and coal-store have the same architectural characteristics. The walls are of red brick, with a stone course on top of the base; above, there is plain brickwork; then another stone course; and above this again pannelled brickwork, with coping-stones at the top. The retort-house is built with entrances, ample in number and spaciousness, from the yard. On the front of the house, there are no less than nine of these archway entrances, which are Norman in design, and two at the north end, while above there are circular openings for light and aids to ventilation. The roof is a light steel one; the principals being 10 feet apart, and the slates attached to angle steel purlins with lead nails. At the apex, and for the full length of the house, the roof is completely open, to a width of some 3 feet; while between the lower portion of the roof at the side and the higher portion of the roof covering the vertical retort-settings, there is a louvre ventilator, also the full length of the house. The sectional drawing of the retort-bench and the photographs of the building, will show the character of the roof, and the appearance presented by the variations in height. The span of the highest part of the roof is 36 feet, and this covers the vertical settings. The lower portion of the roof (which supplies cover for platforms and the free space in front of the settings) forms a sort of lean-to on to the higher or main part of the building—this descending to the eaves to 32 ft. 6 in. from ground level, while to the apex of the main roof the height from the ground is about 60 feet. This higher part of the roof is entirely supported on rolled steel stanchions, two lines of which, at 17 ft. 6 in. centres, also furnish support for the bench; while (as shown in one of the drawings) the third line of stanchions supplies support to a 14-inch concrete wall between the retort-house and the coal-store—the stanchions being each anchored to two H irons in the floor of the coal-store; so that in every way provision has been made for security in withstanding the thrusts and strains



Cross-Section of the Retort-House with the Woodall-Duckham Vertical Retorts.

View showing Stanchions supporting the Roof and End of Bench of Vertical Retorts.

occasioned by the storage and the movement of large bodies of material. The retort-house, which by the way abuts on to the embankment of the Leeds and Liverpool Canal (by which coal is brought to the works), is 208 feet long by 55 feet wide, inside measurements.

The coal-store is not so long as the retort-house; being 138 feet long—its length for one thing being curtailed by the engine-house at one end and by site restrictions. The latter occasions the peculiar shape of the store—it being 78 feet wide at one end and only 38 feet wide at the other; so that every principal of the roof has a different span. The roof in other respects is just the same in character as that of the retort-house. The store having an average width of 58 feet, and the length being 138 feet, and it being possible to store by conveyor to an average depth of 30 feet, the capacity of the new store will be about 5000 tons without trimming.

West's Coal Storage and Handling Plant.

The coal-storage plant is the principal feature of this new coal-store. The coal is brought to the works by the canal (which is about 40 feet above the level of the store and retort-house floors) and it will be transferred from the barges to the store over a short bridge, by means of small waggons of 4 cwt. capacity, which will be pushed by men. By means of a tipping arrangement, the waggons will be overturned, and the coal shot into the receiving-hopper, which marks the commencement of the contract that was obtained by West's Gas Improvement Company for the coal-store plant. This plant has distinctive features; and its scheme comprises the breaking, elevating, and storing, or delivery into a shoot which feeds the elevator in connection with the installation of vertical retorts. The floor of the store is so prepared that, when it is necessary to take coal from store, it may be emptied through outlets and feeders to the coal-store conveyor, re-elevated, and delivered to the retort-house elevator for transport to the coal-hoppers over the retort-bench. It will be seen that the coal-handling plant supplies quite a variety of methods for dealing with the coal as delivered or from store.

To describe the plant in a little more detail, and starting at the receiving-hopper. Below this there is a mechanical reciprocating feeder and screen, which will screen the fine coal, and pass the large pieces forward to a breaker fitted with two pairs of claw rolls. Shoots direct the coal from the screen and breaker to a gravity-bucket conveyor. This conveyor is continuous, and extends the whole length of the store—the upper track (right up in the apex of the roof) being fixed to the main roof principals, and the lower track is accommodated in a tunnel (7 ft. wide by 6 ft. deep at one end, and enlarging to 7 ft. 9 in. at the other end) built centrally below the coal-store floor. The vertical runs are carried through brick shafts at either end of the house, which shafts are large enough for men to climb so as to give any needed attention to the conveyor. The roof was specially designed for the reception of the upper track of the conveyor. The coal-store floor is provided with outlets and valves for feeding the coal to a West's travelling filler and regulator, for supplying the coal in even quantities to the conveyor buckets; the same filler being utilized for both receiving the coal from the store or from the breaker and screen.

Among miscellaneous points about the plant, it may be mentioned that it is capable of dealing with 30 tons of coal per hour—the small coal of 1½-inch cube passing through the screen, and the large pieces being broken to that size by the breaker. The gravity-bucket conveyor is fitted with West's type of chains, similar in general design to those which are adopted by the contractors in the construction of their elevators and conveyors, with cast-steel renewable bushes, which provide for a sufficient area of bearing surface for the joint pins. The gravity buckets of the conveyor are of pressed steel plate, and made without seam or joint. The upper conveyor track is provided with dumping gear placed at suitable distances apart for discharging the coal from the buckets. The buckets are arranged so that they can be removed from the conveyor without disconnecting the chain. For attending to the working parts of the upper track, there is a platform the full length of the conveyor, with handrail and standards on both sides.

Electric driving has been adopted for the plant. The motor provided for operating the coal-breaker and screen is of 15 brake horse power at 600 revolutions per minute; that for driving the coal-conveyor is of 7 brake horse power at 650 revolutions per minute. These motors are of the totally enclosed and dust-proof type; and the electrical starting gear is fitted with auto no-volt and overload release.

At the canal or coal-receiving end of the coal-store is the engine-house, in which is the electricity generating plant. This installation (which is also part of West's Gas Improvement Company's contract) comprises a 42 effective horse power gas-engine, which is directly coupled to an electrical generator of 26 kilowatts, 220

The Vertical Retort Bench under Construction.

Stanchions Supporting the Roof and End of the Bench of Vertical Retorts.

The Combustion Chambers of the Vertical Retorts.

volts, continuous current. The plant is, of course, complete with switchboard and all other necessary electrical fittings. The working will be so arranged that the coal and electrical plants will only be in operation during the day.

The walls of the engine-house are carried to a height somewhat greater than the retort-house roof; and on top a water cistern of 20,000 gallons capacity has been placed. For works' purposes water is pumped from the Lancashire Calder. But Mr. Leather has been hitherto somewhat hampered in this regard; and so, while building, he made ample provision for the future in this direction.

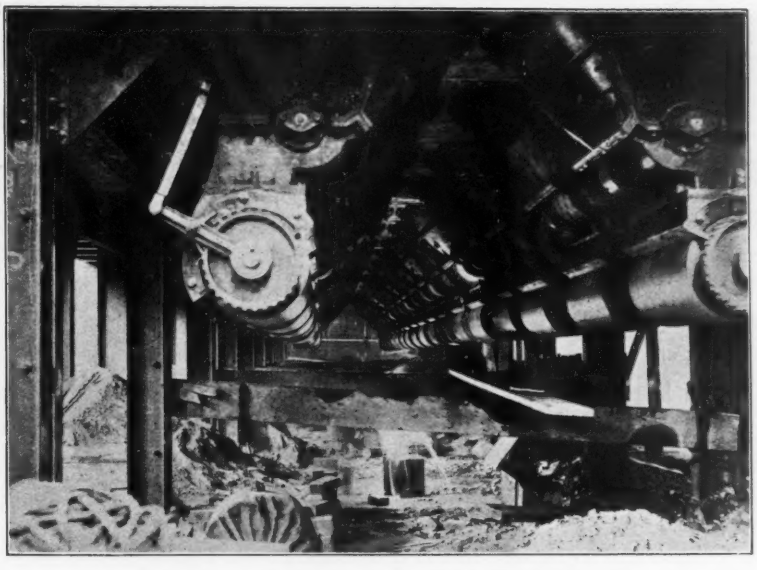
The Woodall-Duckham Settings.

From the plant for the removal of the coal from the coal-store to the hoppers above the retort-bench in the new house, to the construction of the bench complete, the entire contract was given to Messrs. Woodall and Duckham; and for them the mechanical parts and the fire-clay work has been executed by Messrs. Gibbons Bros. It will have been seen that the coal is broken before it is put into store; so that it is ready to be transferred to the overhead hoppers without further preparation. This being so, it will be fed direct (as far as possible by gravity) into the boot of the elevator, which is situated at a spot in the coal-store central in the length of the retort-house. The length of the elevator is nearly 60 feet between centres. It feeds on to a band conveyor, running down between the two continuous lines of hoppers, and discharging into them on either side. The capacity of this portion of the coal-handling plant is 30 tons an hour. The two lines of hoppers have each a length of 90 feet; and their capacity is equal to some fourteen hours' supply to the retorts.

The Two Upper Lengths of Vertical Retorts.

Disposing of the coal-handling plant, leaves us free to devote attention solely to the Woodall-Duckham vertical retort-settings. The greatest feature of interest in this installation is that it is the first, on the Woodall-Duckham system, that has such a continuous length. The Kensal Green installation is a larger one by four retorts. There are at those works ten settings of fours; but they are in two parallel blocks of five settings. Here we have nine settings of fours in one length, 10 feet centres and 17 ft. 3 in. from the front to the back buckstays; and it is a novel sight to view the full length from one end either below, above, or in front. But these nine settings only occupy one-half of the new house; and there is sufficient room left to allow of 10 feet space between this bench and one of corresponding size in the vacant part of the building. From which it will be seen that Mr. Leather has provided in his design for a house and plant with a carbonizing capacity of 180 to 200 tons a day.

The settings are carried on three pillars composed of rolled steel joists. The two outside ones (which are 16 in. by 16 in.) are those to which reference has been made in describing the means of supporting the roof. They also carry the coal-hoppers, and act as buckstays to the settings. So that their service is manifold. The middle pillar is composed of two 10 in. by 6 in. joists, and only runs up to the concrete floor of the settings. All the vertical supports are carried on a substantial bed of concrete in the floor of the retort-house. The floor of the settings (which is 9 feet from the ground level) is composed of 14 in. by 6 in. rolled steel joists, on which sit the cast-iron mouthpieces for the retorts. The space between these joists and round the mouthpieces is filled in with concrete, and this forms a solid floor. The bottom discharging gear and hoppers are clamped on to the underneath of this floor by means of bolts bedded in the concrete. There is, of course, a similarity with the Kensal Green settings in many of the constructional details; but no excuse is needed for a little repetition to make this article as complete as possible, in order that readers may not have to fill in the details on their own account by reference to what has been previously published. To proceed, then, while underneath the settings, with the bottom fittings—the coke hoppers and extractors. The hoppers are each formed with a sloping back plate, upon which rests the charge of coke in the retort. At the bottom of this plate, is situated the extractor-roll with its helical blades, which remove the coke from the retort. Below this is the discharging drum, which is faced, so as to keep the bottom of the retort gas-tight. The speed of the extractor-roll is variable; being driven by means of a toothless ratchet, the



Bottom Mouthpieces and Discharging Rolls of the Vertical Retorts.

throw of which is regulated by means of a screw attachment on the main driving-shaft. The actual working speed of the extractor-roll is 1·2 revolutions an hour; and therefore very little power is required for its operation. Only one revolution is made by the discharging drum in about twelve minutes. The plant is driven by an 8-horse power gas-engine; and, after the speed has been suitably reduced, a rocking motion is imparted to both the bottom and top driving shafts by means of cranks. The speed of the bottom shaft is actually two rocks a minute; that of the top, fifteen rocks a minute. Arrangements are made so that both the extractor-roll and discharging-drum can be worked by hand, should there be any reason for so doing. There will be no conveyor underneath the bench (at all events at present) for the removal of the coke; but the coke drums will discharge direct into wooden barrows, which will be wheeled out under the producers into the yard—a distance of about 50 feet—for stacking.

Proceeding to the work above the bed of the settings. The retorts attached to the cast-iron mouthpieces are 25 feet long, with a continuous taper from bottom to top; the dimensions at the bottom being 29 in. by 20 in. and at the top 21 in. by 9 in. They are made in 3 feet lengths, with the ends flanged, in order to give a larger surface at the joint. Each retort is finished at the top by a cast-iron mouthpiece, to which is attached the feeding device and the gas take-off pipe. The feeding device is a faced cylinder drum, which rotates at such a speed that it always contains an excess of coal in proportion to the coke extracted. A short movable shoot brings the coal from the overhead hoppers to the feed-roll. As the coke is extracted at the bottom, the whole charge in the retort gradually descends, to allow the coal to enter the retort from the coal-feeding device. From which it is seen that the regulated speed of the coke-extractor governs the rate at which fresh coal enters the retort, and the passage of the charge through the latter.

Concerning the heating of the settings. They are of the regenerator type—the generator being built on the same concrete floor as the settings; and the back wall of the generator forms one of the vertical walls of the setting. The primary gas enters two flues at the back of the generator, and is taken upwards to the combustion chamber which is situated round the top of the retorts. The gases descend through cross flues to the bottom of the setting, where they enter the regenerator (built in the opposite wall of the setting to the generator). The waste gases are taken from the regenerator by down-cast flues, in accordance with Mr. Leather's own special wish, to a main waste-gas flue, running underground, to the works' chimney. The secondary air enters the top of the regenerator, descends it, and is taken across to the generator side of the setting in flues built around the retorts. It then ascends to the combustion chamber, in parallel flues, with the producer gases. There are four sets of nostrils of large dimensions; and the gases are lighted in the combustion chamber before they impinge on the retorts. The combustion chamber is entirely built in silica; and the retorts are separated by means of special wing-tiles over their broad sides, which prevents any deformation or cracking in this most particular part.

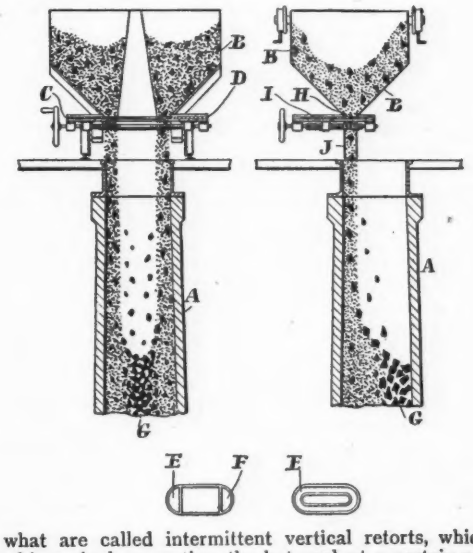
The producers are charged by cold coke, which will be raised, by a mechanically worked lift, to the producer floor in ½-ton skips, and will then be carried from producer to producer by a runway arrangement. The top of the producer is formed with tiles, and is perfectly level; so that the coke for charging can be dumped on it before filling the producers. An interesting feature is the producer charging-door. It is of a French type, and consists of two separate covers—an inside one fitting into the opening itself, and an outside hood—the whole finishing quite flush with the surrounding tiles. In charging the producers, the man lifts out the first or heavier lid; and then, when he is absolutely ready to put in the coke, he has only to lift out the light inner one, and push the coke into the producer. The advantage of this double door is that a very effective seal is formed, and there is no flaring away of the producers while the men are charging them. With a single heavy door for the producer, there is trouble in keeping it quite gas-tight. The settings are provided with a chequer-plate platform to serve as a clinkering-stage; and in every other way facilities are given for the conduct of the work, and for ready examination of the bench and its equipment.

It is expected that the retorts will be under slow fires in about a fortnight's time; so that very shortly now Mr. Leather will be gaining experience with his new carbonizing plant, which is as great an advance on his inclined retort-settings as—indeed, a greater advance than—these were on the direct-fired ones.

[We have to thank Mr. Leather for his assistance in obtaining the particulars on which this article is founded during an inspection of his new plant, and for providing the accompanying interesting illustrations. The Burnley gas undertaking has made excellent records in the past; we look for a continuance of that excellence under the new order of things.]

CHARGING VERTICAL RETORTS.

THE number of our contemporary "Le Gaz" for the past month contains the specification of a French patent taken out by Messrs. Robert Dempster and Sons, Limited, of Elland, for a system of charging vertical retorts. The following is a translation of the principal portions of the document.



In what are called intermittent vertical retorts, which are charged in a single operation, the hot coal, at a certain point in the process of distillation, forms a more or less plastic substance from which the gas escapes with difficulty, except at excessive pressure. It is consequently regarded as an advantage to fill the

retort by means of streams of small coal and lumps, so as to facilitate the passing of the gas through the lumps to the outlet-pipe. For this purpose, it has been proposed to screen the coal before filling the retort, and then put the lumps in the centre or on one side, while the small coal and dust are placed round the edges or on the other side. The experience of the inventors, however, has demonstrated that, in practice, it is impossible to run simultaneously a stream of small coal and lumps through the retort at a regular and previously fixed rate of speed, because the coal is sometimes dry and sometimes wet, and consequently the proportion of lumps to small will vary. Moreover, the average sizes of the lumps will also vary.

All these conditions tend to give one stream of coal greater speed than the other, and consequently the surface of the coal in the retort is inclined. The inventors have found that when the angle of inclination becomes steep enough, the coal falls, rolls, or slips to the lower side, so that the small and lumps are more or less mixed, and the object aimed at is not attained. They have also observed that, in falling from the hopper, the lumps, owing to their greater density, come more rapidly under the action of gravity than the small pieces, and do not cease moving so quickly as these when they come into contact with the coal already in the retort, but tend to place themselves in the lowest part of the surface of the coal. On the other hand, the lumps, in falling more quickly than the small, rapidly form a cone or slope which tends to distribute them in such a manner that at the outset those falling to the centre roll to the sides and mix with the small, whereas at the moment when the retort is full the lumps are almost uniformly distributed, so that the effects of preliminary screening are almost nullified.

According to the present invention, the coal is run unscreened into the retort in one or more thin streams, in proportion to the section of the retort. Thus various rates of speed, and the different tendencies to rolling and slipping of the large and small pieces, are utilized, as well as their rebound from the sides of the retort and the slope of the heap of coal, to form a column of lumps. One or several openings can be made in the hopper, truck, conveyor, or other device employed for charging the retort. These openings are relatively narrow, and in the form of a semicircle or other shape, through which the coal is discharged at a point near one of the sides or at points adjacent to opposite sides of the retort. If the coal is discharged on one side only, the lumps will form a column on one side; but if it is discharged round opposite sides, or right round the sides, the lumps will form a column in the centre.

The accompanying illustrations are examples of the application of the invention either to form a column of lumps in the centre or at the side of the retort. A is a part of a retort, and B a hopper or annular or other truck, capable of moving along the top of a setting. The hopper has two sliding doors C D, worked simultaneously by means of a hand-wheel and screw with contrary threads, or some other similar device. These sliding doors, when brought together, close the two openings E F of the hopper, shown in the first of the small diagrams, which is a view from below. The outlet orifices allow of the discharge of relatively thin streams of coal at adjacent points or opposite sides of the retort. When the doors are moved away from each other, they open the orifices E F, and the coal falls in two streams immediately forming a basin. The small pieces stop quickly, while the lumps roll, slip, or bound into the centre, as shown at G. The orifices E F may be replaced by an annular outlet, as shown at F in the second of the small diagrams; the opening being effected by any suitable means. The hopper or truck has a discharge orifice—controlled by a damper I. A shoot or trough J, relatively narrow compared with the width of the retort, can be added, to prevent the scattering of the coal. This shoot can be fixed on hinges, so as to avoid the upper lids of the retorts. In this case, the coal falling from the outlet H, and discharged on one side of the retort, forms a slope along which the lumps roll or glide, and from which they rebound—in this way forming a slightly compressed column of lumps along all the height of the side opposite to where the shoot delivers the coal to the retort.

Various methods can be adopted to charge retorts with relatively thin streams of coal; and the devices represented are here merely given as examples, without any restriction on the manner of applying the invention. Its essential feature is the charging of a vertical retort in a single operation with coal run on one or several sides of the retort, which can be done equally well without a hopper or feeding-trough specially constructed for the purpose. In a slight modification of the invention, a relatively narrow stream of mixed coal is discharged in the centre of the retort, in which case one or several columns of lumps are formed around and along the sides. This method is not so good as the discharge of the coal near the sides; but it gives practical results when the retort has a large section, and must be regarded as coming within the scope of the invention.

Mr. James Grieve, who was for nearly thirty years Secretary of the Moffat Gas Company, and latterly also a Director, died recently in his 65th year.

From the 42 applicants for the position of Engineer and Manager of the Carlisle Gas-Works, in succession to Mr. W. J. Smith, B.Sc., who has been appointed Gas Engineer to the Bolton Corporation, six have been selected as the most suitable; and their qualifications are being investigated.

FLETCHER, RUSSELL, AND CO.'S NEW GOODS.

Recent numbers of the "Journal" have furnished testimony to the activity of the makers of gas appliances in the production of new goods for the approaching season; and to-day we are able to call attention to what has been done by Messrs. Fletcher, Russell, and Co., Limited, in this direction.

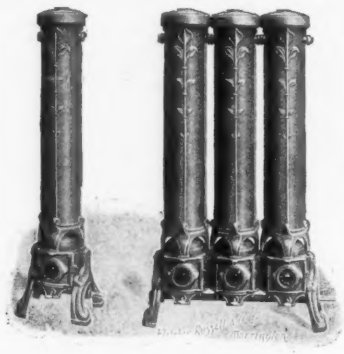
Below are given illustrations of the firm's "Madeira" and "Aden" fires, both of which are of artistic, graceful, and original design, and are constructed with large canopies to prevent any fumes from entering the room in which they stand. They are fitted with the firm's latest improvements, patent non-lighting-back burners with single or double row of fuel, single or grid pattern fire-bars, as required, and are suitable for rooms up to 18 feet square. The firm's "Nubian No. 2" stove is identical with their

The "Madeira."

The "Aden."

ordinary "Nubian" stove introduced last year, with the exception that it has their patent single-row fuel and single fire-bar. It is also fitted with the non-lighting-back burner with an adjusting screw-jet, in order to regulate and maintain the maximum consumption at any pressure; and it is suitable for rooms up to 14 feet square. The "'H' Register" stove is an adaptation of the firm's well-known "H" pattern to the register type of fire.

The "Ariel" radiator, of which an illustration is given below, is constructed on a new patented principle; each tube or column being self-contained. It embodies the same advantages over steam, hot water, and other gas-heated radiators that are claimed by the firm for their "Floral" pattern—viz., that there is no necessity for excavating and building a heating chamber, and that no boiler, expansion-tank, pipe-runs, &c., are needed. Only a small connection for the gas supply is required; and the radiator can be brought into immediate use. The necessity for building a flue is obviated; and a complete installation can be fixed in a few hours. Useful work commences immediately after the radiator is

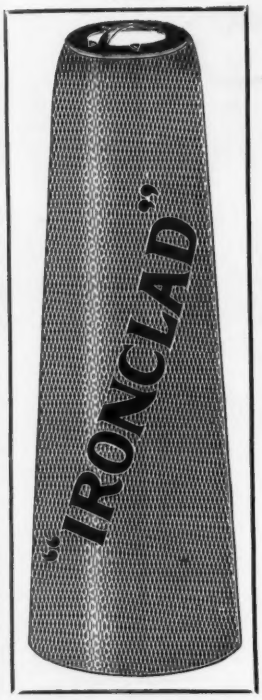


The "Ariel" Radiator.

lighted; there being no necessity to first heat up a large body of metal and water. Other advantages claimed for the radiator are that its action does not give rise to smell or dangerous fumes, as the flame does not come in contact with any metal or other substance. There is nothing to get out of order, or give the slightest trouble, no "furring up" of tubes, and therefore no necessity to "dismantle" and reassemble the parts. As, in addition to these qualities, the cost of maintenance is stated to be *nil*, the firm appear to be justified in claiming this as the "ideal" radiator; being rapid in heating, clean, safe, and economical in use.

Any of the above, and any pattern of the firm's fires, can be supplied in a variety of finishes; special attention being drawn to the Majolica enamel, in black or colours, and the Chimatto enamel in two or three colours. It is claimed that these enamels have the advantage of being absolutely permanent, and only require dusting or washing. The colours and shades are most delicate and artistic in appearance, and admit of the finest decoration in colours at a low cost.

THE



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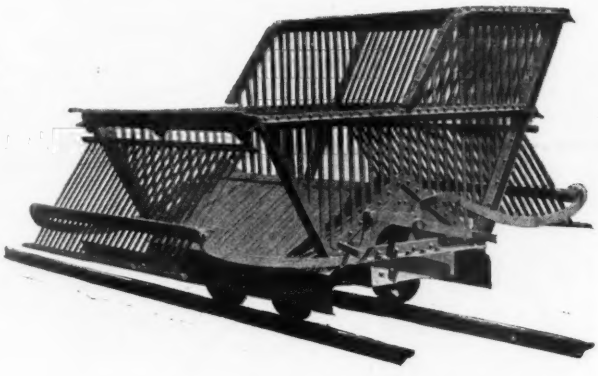

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NORTH OF ENGLAND GAS MANAGERS' ASSOCIATION.

Half-Yearly Meeting at South Shields.

The Sixty-Fifth Half-Yearly General Meeting of the North of England Gas Managers' Association was held in the Crown Assembly Hall, South Shields, last Saturday. On account of the interesting nature of the proceedings, there was a larger attendance of members than usual, as well as of visitors. Mr. T. H. Duxbury, of South Shields, the President, occupied the chair.

Welcome by the Gas Company.

Dr. J. F. Armstrong, J.P., the Chairman of the South Shields Gas Company, on behalf of the Company, extended a very hearty welcome to the Association. He remarked that the first meeting of the North of England Gas Managers' Association ever held took place in South Shields; and he believed that three times since they had had the pleasure of entertaining the Association. Those who were there on the last occasion inspected the Oyston Street works of the Company; and when those present visited the works that day they would find that a great transformation had taken place. They had been all recast and remodelled, under the able direction of the present Manager, their President. He thought such meetings as the one at which they were assembled ought to do a great deal of good. They very often gave rise to original ideas, which were of considerable benefit to the industry; and as far as the South Shields Gas Company were concerned, they would give the members every encouragement. To get the maximum quantity of gas from a ton of coal, and to use it to the best purpose, ought to be the main object of these meetings. The Company would be very glad to see the Association again.

The Late Mr. J. H. Cox.

The President, referring to the recent decease of Mr. J. H. Cox, of Sunderland, said he thought it would be fitting if a vote of condolence were sent direct from the meeting to the bereaved family. He would be glad, therefore, if the meeting would signify their approval by standing.

This request was at once complied with.

Apologies for Absence.

The Hon. Secretary (Mr. H. Lees, of Hexham) intimated that apologies for absence had been received from Mr. Charles Wood, of Bradford, Mr. A. Clement Hovey, of Milan, Professor Bone, of Leeds, and a number of others.

New Members.

The following were admitted to the Association:—

Members.—Mr. R. S. Duncan, Birtley; and Mr. Horatio Morris, Maryport.

Associates.—Mr. W. Andrew Cowley, of Spennymoor; Mr. Norman S. Mitchell, of Cockermouth; and Mr. Arthur Pickering, of South Shields.

The President's Address.

The President then delivered the following

INAUGURAL ADDRESS.

Gentlemen,—I thank you for the honour you have conferred upon me by placing me in the presidential chair of the Association for the current year. Knowing my own limitations and shortcomings, however, very much better than anyone else, and recognizing the high standard which your Past-Presidents have set, including our much-esteemed and highly-respected ex-President, Mr. Ford, who so ably filled this chair last year for the second time, I candidly confess the reluctance with which I consented to nomination by your Committee. I hope that on the termination of my year of office, the interests of the Association may not have suffered.

Before entering upon gas topics generally, I wish to express regret, with which I am sure you will all join, at the loss since our last meeting of three members of the Association. I refer to the late Mr. J. H. Cox, of Sunderland, Mr. George Keyte, of Workington, and Mr. W. W. Morris, of Maryport.

Mr. Cox was one of the founders of the Association, and always had its interests at heart. Until recent years, he was in regular attendance at the meetings. He was most highly respected, and has left an honoured name in the North of England, with a life's work truly worthy of emulation.

Both Mr. Keyte and Mr. Morris were at one time in the employ of the South Shields Gas Company. The latter I did not know personally, but Mr. Keyte was my chief assistant for some time after I came to South Shields. I can therefore personally vouch for the conscientious and sterling character he possessed, and for his knowledge and ability in matters appertaining to gas.

I wish also to refer to another loss which the Association is about to sustain by reason of Mr. W. Doig Gibb's removal from the North of England to London. This loss, though of quite a different character to those already mentioned, will, nevertheless, be tinged with regret by all who have had the pleasure of meeting Mr. Gibb either professionally at these meetings or in the closer ties of personal friendship.

I also wish to congratulate Mr. Thomas Hardie on his appointment to the chief engineership of the Newcastle Gas Company and, as such, to welcome him on this, his first appearance at a gas meeting since being actually installed in his new and responsible position. The Newcastle Gas Company are to be congratulated on the fact that they had such an efficient and able staff of officers in their service as to enable them to fill all the recent vacancies by promotion. This is as it ought to be. Continuity of service is a valuable asset to any undertaking (providing, of course, that it does not degenerate into lackadaisical indifference to progress with the times), because it means progressing along preconceived general lines of policy—modified and adapted, of course, from time to time as circumstances require.

Gas Official Staffs and Employees.

The duties of gas engineers and managers have always been very varied and multitudinous; but they have increased considerably in recent years, and there is every indication that the accompanying responsibilities will continue to increase by reason of the competition which now abounds. The old adage, "the survival of the fittest," will, therefore, so far as success in the gas engineering profession is concerned, be more than ever applicable in the future.

A higher standard of work than formerly is now demanded from all classes of gas men—chief officials and subordinates alike. The ratio of this necessary increase in human efficiency is, however, very much greater as applied to the official staff than to the workmen, by reason of the extension of machinery, improved methods of manufacture and distribution, and to the steps which have now to be taken to secure new business. Efficiency and success of machinery in gas-works, while easing manual labour, necessitates strict supervision on its upkeep and maintenance to prevent breakdowns occurring.

The training for gas engineers was admirably laid down by Mr. Gibb in his presidential address; but it may be mentioned that the endowment of the Livesey Chair in Gas Engineering at the Leeds University now enables students to obtain a diploma in gas engineering and (or) to qualify for the degree of "B.Sc." with gas engineering as the recognized principal subject. There is also the fellowship in gas research which has been established by the Institution of Gas Engineers at the Leeds University; considerable benefits ought to result to the gas industry from this combination—both being under the same professorship.

Apart from the technical training, however, much depends on individuality as to the extent of success in the profession, which success is gauged primarily by the balance-sheet, combined with ability displayed in meeting obstacles which continually arise.

A good share of common sense, tact, physical fitness, and a fondness for hard work during any of the hours that God sends, are essential requirements. To the right class of man, the duties of a gas engineer being so very varied in their character, they induce not only keen interest in one's work, but an actual fascination for it. To such I strongly commend the gas profession.

The extent to which technical matters are interwoven in a gas company's business render it more essential than formerly for the chief official to be a technical man. But he must have a good commercial knowledge. Further, an engineer is a skilled man, and must perforce have devoted some years of his working life, for little or no pay, in qualifying himself. It is only natural, therefore, that this in time should bring its own reward.

In any case, a secretary can only efficiently (or otherwise) handle to the best advantage the money earned by the engineer's good working. If this working be not good, a secretary—no matter how clever he may be—cannot make the company so prosperous as it might otherwise be. Alternatively, an engineer's good working can very easily be ruined by indifferent commercial handling of raw materials and residuals. Therefore the man who is responsible for the working should have the say with the directors in the commercial handling, to ensure the best financial results being obtained.

I know that in this matter I may be treading on somewhat dangerous ground; but I will at once make myself quite clear by recognizing and appreciating to the full the good work done by several secretarial managers with whom I have personally come in contact, and, further, I say that purely secretarial work in all but the smaller gas companies would occupy too much of the engineer's time, even if he were able to undertake it. So my remarks are not intended to depreciate the necessity for secretaries' services. In the medium-size and larger gas companies, there is much responsible work for them to do, and it is of the utmost importance for the success of the undertaking that the secretary and engineer should work amicably together, as I am pleased to recognize has been the case with my much-respected colleague, Mr. Penney, and myself.

These points have been recognized for some time by the large London Gas Companies, who have gone further and appointed gas engineers of eminence on the directorate and also in the position of Chairman of Directors—notably, Mr. Charles Carpenter in the case of the South Metropolitan Gas Company, Mr. Corbet Woodall, of the Gaslight and Coke Company, and Mr. Charles Hunt, of the South Suburban Gas Company. This feature is one worthy of emulation by Provincial gas undertakings.

Owing to the important part which the distribution department now plays in a gas undertaking, it is absolutely essential in all but

the very small works to have a distribution superintendent, to devote the whole of his time to this branch. There is an opening in this direction for many aspiring gas managers, who I am certain would do infinitely better for themselves by specializing in gas distribution work—because higher salaries will be paid to distribution superintendents in medium-sized gas-works—than to the managers of small works.

The training for a distribution superintendent's position should follow in the initial stages along the lines of the training of the gas engineer, but omitting structural engineering, and developing in its stead extended knowledge of gas supply and electricity.

The separate examination in gas supply (as distinct from gas engineering) recently introduced by the City and Guilds of London Institute will prove the specialized knowledge of candidates for positions of distribution superintendents. The higher standard of training must also be extended to employees outside the official staff, especially in the distribution department, where it is impossible for a foreman to see every job, owing to the men being scattered over the district of supply. Individual intelligence is, therefore, particularly necessary among distribution employees; and it is to the interest of all gas undertakings to encourage them to thoroughly appreciate the importance of their work, also to assist the younger men in attending classes and lectures preparatory for the City and Guilds of London examination in gas supply.

In my opinion, however, last year's examination paper in the Ordinary Grade was too stiff for the general class of distribution employees. It may be argued that the standard of these examinations must be kept high, in order to raise the qualifications of distribution superintendents; but my answer is that the Honours Grade covers them. The effect of the examinations so far will, I am afraid, frighten the greater number of the working employees from making another attempt, because they feel that it is beyond them; and this is not in the best interests of the gas industry.

If my surmise be correct, and the standard of the questions in the Ordinary Grade be not lowered at any rate for a few years, then other steps should be taken with a view to increasing the knowledge of the general body of distribution employees, by instituting special courses of lectures at our respective works.

It is to the benefit of all industries, gas included, that an amicable relationship should exist between the management and the workmen. The ideal arrangement appears to be co-partnership, which has been such a success with the South Metropolitan Gas Company, and which is now being worked on a practical scale by the Walker and Wallsend Gas Company, from whom we shall be interested to learn their impressions in due course.

Meanwhile, it is worthy of mention that while Trades Unionism has in recent years obtained a much stronger hold with all classes of labour, my experience is that both workmen and their Union leaders are much more amenable to reasonable argument than they were formerly. The recent letter of Mr. John Wilson to the Durham miners clearly indicates that all the men's leaders are not of the revolutionary type that some would have us believe.

ADVICE TO JUNIORS.

The formation of a Junior Gas Association such as exists in many other districts, is perhaps hardly advisable in the North of England owing to the scattered area covered by the membership of this Association, and the relative number of small as against large gas undertakings, whereby the number of assistants is naturally limited. But we welcome juniors as associates of this Association, and personally should like to see them play more prominent parts therein.

While I am a comparatively young man myself, much as it may therefore seem out of place, I venture to offer some advice to juniors, based on my personal experience of gas company's directors, corporation committees, and former chiefs, under whom it has been my privilege and pleasure to serve.

I say then: Recognize throughout that hard work kills no one; and while one's ordinary vocation may involve only a specific amount of what is termed duty, something more than this is essential. It is the extent of this excess service and duty (which may not always be known to directors or chiefs) that goes a long way towards securing ultimate success in one's career. Endeavour to anticipate the requirements of chiefs, and loyally carry out their wishes and instructions. Consider nothing too menial, and be content (within limits, of course) with your position for the time being, as continual unrest and constant looking out for a move are not satisfactory features. To quote Shakespeare, "there is a tide in the affairs of man which, taken at the flood, leads on to fortune," which I transcribe into meaning that one should avail oneself of the opportunity when it arises. "Having the opportunity" and "availing oneself of it" are, however, two quite different things; and I am afraid that a lot of young men of the present day are not properly availing themselves of the opportunities they have. Temporary success is worse than useless; and a weak man—just as a weak link in a chain—must soon be found out under the stress of present-day requirements.

STATUTORY POWERS AND PARLIAMENTARY LEGISLATION.

From time to time, mention has been made of the advisability of seeking to have the Gas-Works Clauses Acts, 1847 and 1871, amended; and while I agree with the necessity for this on many points, it must be recognized that whenever such revisions are put forward, there is certain to be opposition from various quarters. With the precedents of Parliamentary Committees under the present Government before us, and their leaning towards municipalization as against private enterprise, it is probably better to wait a little before moving in the matter, because after all "'tis better to bear the ills we have than fly to others that we know not of;" and it is possible that the remedy in this case might prove worse than the disease.

Only those who have been intimately associated with the promotion of a Private Bill and its progress through Parliamentary Committees against formidable opposition, can fully appreciate the work entailed. Such was my fortune (or misfortune) in connection with the South Shields Gas Company's Act of 1904.

I do not purpose dealing with the details of either the promotion or the opposition; but I wish to refer to the costliness of the whole thing, and to express the opinion that it is time the procedure appertaining to the promotion of Private Gas Bills should be altered so as to reduce such costs.

Led by Parliamentary Agents whose principle appears to be to make the cases last as long as possible, local authorities frequently oppose Gas Company's Bills apparently for the purpose of showing their authority by having a shot at the company; the result being that the costs of promoters and opponents alike are run up enormously. The brunt of both parties' costs have to be borne by the gas consumers, who constitute the main body of ratepayers; for they have to pay the opponents' costs through the rates and the gas company's costs by the price of gas being increased or a reduction in price being deferred. The prevalent impression, that such costs come out of the proprietors of a gas undertaking, is a fallacy. They only suffer to a very small extent, even under the sliding-scale; and if local authorities fully appreciated this, opposition and its accompanying costs would be considerably curtailed.

As to the advantage of the sliding-scale as against maximum dividends, every case requires to be dealt with on its own merits; and it would be inadvisable to lay down a hard-and-fast rule for one or the other system to be applied to all gas companies. I am satisfied that it would have been better for the former shareholders of the South Shields Gas Company if it had continued on the maximum dividend basis, instead of going on to the sliding-scale in 1879; for at one time gas was sold at too cheap a rate so as to allow of higher dividends being paid. Meanwhile the works suffered in point of maintenance, and subsequently the greater portion had to be reconstructed within a short period. The price of gas had then to be increased, and the dividends payable and the market value of the stock fell accordingly. Matters are now righting themselves; and I hope it will not be very long before we can again reduce our selling price.

It appears to me that many electrical undertakings also have been selling current cheaper than was justified—on the principle of "business at any price." The proprietors will, if I am not very much mistaken, suffer to a very much greater extent than ours have done.

Respecting recent gas legislation, by far the most important feature is the insertion of a calorific power test in the Gaslight and Coke Company's Act, notwithstanding the fact that it was by agreement on the "give-and-take policy" between the Company and the London County Council. While, perhaps, it is no business of a Provincial gas engineer to question the action of the Gaslight and Coke Company in this matter, the excuses I have for doing so are that my remarks cannot have any effect upon them, and I feel the subject is of great importance to the gas industry.

Having reference to the difficulties under which gas undertakings work by reason of parliamentary obligations and restrictions, and to the trouble that has been caused to those gas companies who have sought a reduction in illuminating power to the now generally recognized 14-candle power standard, it does appear to me to be unfortunate that, even by mutual agreement, a calorific power test with penalties should have been inserted in a Gas Act without the illuminating power test being abolished altogether. If this had been the *quid pro quo*, then nothing could have been said against the "principle" as apart, of course, from the limitations under penalties of a new standard.

The gas industry ought not to have any additional fetters placed upon it. Relief from some of its present obligations should rather be sought for and fought for when opportunity offers—considering the altered present-day conditions, as against the years 1847 and 1871, when the Gas-Works Clauses Acts were passed.

I am not a supporter of the argument that the recognition by Parliament of a calorific power standard may be welcomed by the gas industry as a preliminary step towards the abolition of illuminating power tests. I confess that my fear is that the Gaslight and Coke Company's case may rather operate as the thin end of the wedge towards an additional obligation being placed upon gas suppliers, unless determined opposition is provided to thwart it.

Respecting the limitations of the above-mentioned calorific power test, I have been considering them as if applicable to the South Shields Gas Company, where an illuminating power standard of 14 candles has been in operation for four years, and a Boys calorimeter (the type specified in the Gaslight and Coke Company's agreement) has been used intermittently—for my personal information and guidance only—for three years. My experience of the Boys calorimeter is that is has a limited range, and that when working under winter conditions with mixed coal and carburetted water gas, the application of the Gaslight and Coke Company's test would place the South Shields Gas Company under greater disadvantages than now exist.

It is of considerable interest to note that the Governor of the Gaslight and Coke Company has subsequently given very strong evidence before a Parliamentary Committee against the provision

for a calorific power test being put in the Bury Gas Bill; and as a result of this, such a test has not been inserted therein. All attempts to enforce a calorific power test on any gas undertaking should be strenuously resisted—at any rate, until illuminating power tests are abolished entirely.

COAL.

When discussing the future prospects of gas and electricity, it has been put to me that, while gas has more than held its own, and is likely to do so for a long time to come, it must eventually succumb whenever the coal supply is exhausted. No one can, of course, refute this; but meanwhile it is interesting to note that the estimated quantity of unworked coal in this country, according to the report of the Royal Commission, will last from 500 to 800 years on the present rate of consumption, making ample allowance for an increasing output each year. This is sufficient to satisfy the most pessimistic gas shareholder that, on this score, his descendants for many generations to come may be expected to continue to benefit from their forefathers' original investment in gas stock.

While coal is essentially the raw material requisite for gas manufacture, it also plays a most important part in the cost of generating electricity. In the case of gas, the greater portion of the cost of coal is regained by residuals; the net cost of coal less residuals being only 20 per cent. of the net cost of gas sold, including manufacture and distribution. With electricity generating, no residuals are recovered, and the cost of coal represents about 30 per cent. of the cost of generating and distributing the current. Market fluctuations in the price of coal affect, therefore, not only the costs of gas manufacture, but of electricity also.

The latest Board of Trade statistics, issued last February, showed that the world's output of coal in the year 1907 was approximately 1,000,000,000 tons; and of this vast amount 267,831,000 tons were provided by the United Kingdom—an increase of 17,000,000 tons over the preceding year. This increase was primarily due to the larger demand for English coal from Germany, Holland, Belgium, France, and Italy; the total export coal trade being over 50,000,000 tons per annum. It may be mentioned that the quantity of coal used by authorized gas undertakings in the British Isles during 1907 was 15,406,753 tons.

Colliery proprietors have naturally worked, and are working, those seams which are the best and least expensive to work; but as these become exhausted, the deeper measures will be tapped at increased costs, which subsequent coal users will have to pay. Sir William Ramsay prophesies that in 200 years the high price of coal will render the conditions of living in this country very difficult; and he urges conservation of its coal stores. We have no Niagara from which power may be obtained; and the manufacturing industries of this country, including gas and electricity, are dependent, either directly or indirectly, upon the coal supply. The great British Empire has been built up on it; and the continuation of our national supremacy depends on it being obtained at a reasonably cheap rate. Even the domestic household must have it in one form or another; and, in point of fact, it is a commodity used by and (or) affecting everyone.

I contend, therefore, that coal does constitute the real capital of this country; and, as such, its conservation is a matter of national importance. This conservation can be effected by substituting gaseous fuel for open coal-fires in dwelling-houses, gas power for initial energy in manufacturing concerns, and by restricting the export coal trade. The adoption of gaseous fuel and gas power would abolish the smoke problem and minimize the dense fogs which periodically envelop manufacturing towns.

Gas coal prices in this district have increased since 1896, though the increases have in themselves fluctuated. The following table, calculated from the tendered prices for one particular coal throughout the intervening period, shows the percentage increase in price each year compared with that paid in 1896.

Year.	Increase. Per Cent.	Year.	Increase Per Cent.
1897	8·3	1904	41·6
1898	50·0	1905	41·6
1899	52·7	1906	58·3
1900	166·6	1907	112·5
1901	58·3	1908	75·0
1902	54·16	1909	58·3
1903	50·0		

Though colliery costs of working have undoubtedly increased during the aforementioned period, by reason of deeper and thinner seams being worked, underground haulage costing more through greater distances travelled, higher wages, Workmen's Compensation Acts, and extended precautionary measures for the safer working of mines, it is very doubtful whether the increases shown in the selling price of coal have been justifiable, even with these extra costs, while in coal boom periods they have certainly not been justified. The comparative high market value of coal during the serious depression which for some time has permeated the United Kingdom in all other industries is unprecedented and, in my opinion, operated to a great extent in accentuating that trade depression by forcing manufacturing costs out of all proportion to the decreased market value of the manufactured goods. The home trade has certainly not justified these high coal prices; and I contend that they have resulted from the large export trade done by coalowners, which made them considerably more independent of the home trade than they otherwise would have been.

I recognize that I am bordering on the vexed question of Tariff Reform; but I assure you this is not my object, for I am no politician, and hope I shall not be misconstrued. I claim to be dealing with coal on its merits as a universal commodity requiring special consideration; and I am convinced that if in recent years a sufficient tax had been imposed on its export, a restriction in the output would have resulted. This would have had the effect of causing greater competition among colliery proprietors for the home consumption, accompanied by a levelling-down of prices to the home manufacturers. What has taken place in the past is lost, and cannot be regained; but the remedy can be applied for the future; and the sooner this is done the better for the country.

Though the price of coal has increased so enormously, the "quality" of coal for gas-making purposes has not improved at all, but rather depreciated (to wit, the working out of the Hutton Seam in the County of Durham); and inferior coals now command both a ready sale and, in some cases, a fictitious value relatively with some of the better qualities. The only real check upon this, so far as the gas industry is concerned, is to frequently test the coal as delivered, preferably by keeping a testing plant in continuous operation; for even coal drawn from the same pit varies considerably in its gas-yielding properties, according to the seam from which it is worked. The following tables give figures obtained in a series of careful tests conducted on a small gas-works plant (not a laboratory apparatus), on coals obtained from different seams in two pits. Obviously, it is inadvisable to give either the names of the pits or a description of the seams.

No. 1 Pit.

Seam.	Gas per Ton. Cubic Feet.	Illuminating Power. Candles.	Pounds of Sperm.
A	10,900	17·96	671·20
B	11,200	17·13	664·00
C	11,000	17·77	670·17
D	11,700	17·15	686·53
E	11,300	18·35	710·93
F	11,200	16·58	636·60

No. 2 Pit.

G	10,900	19·23	718·65
H	11,000	16·05	605·30

In No. 1 Pit, the difference in sperm value (which is sufficient for this comparison) between the best and worst seams shows 10·45 per cent. deficiency, while in No. 2 Pit, it is 15·77 per cent. deficiency; and if the coal were to be purchased on the best seam yield, it is obvious that the buyers would suffer considerably if the worst seam were substituted or mixed in deliveries. The first step requisite in connection with coal testing is correct and careful sampling from bulk; and the above figures indicate the extent to which one might be misled through careless sampling in cases where coal is supplied by the colliery from two or more seams, with or without the consent of the gas company.

So far as coal testing on a gas-works is concerned, I am satisfied that small laboratory apparatus results are comparatively worthless, and that the best method is to isolate one retort (or preferably one setting) from the ordinary carbonizing plant, conducting the gas therefrom through a separate miniature gas plant. Much as I am in favour of this, however, I regret that as yet such an arrangement has not been in operation here—due primarily to lack of ground space. Therefore I have to resort to using one particular coal at a time exclusively throughout the retort-house, for testing purposes; the size of the works enabling it to be done fairly satisfactorily. This, however, can only be arranged periodically, and coals are not continuously under test as I should prefer; while a further disadvantage is that the actual yield of residual products cannot be accurately ascertained. The most important particulars are, however, obtained; and from these, approximate comparative values of coals can be calculated. As the details of my valuation basis may be of interest to some of the members, I give the following particulars.

The duration of the test is usually 72 hours, excluding the time required for scouring the plant. Having ascertained the weight of coal carbonized, gas made corrected for temperature and barometric pressure, coke yield per ton averaged from a few weighed charges, illuminating power of the gas averaged from frequent tests made on the bar photometer night and day throughout the test period, ash in coke, ash in coal, and impurities in the gas, a money value for the coal under test is calculated relatively with the cost of a known or standard coal previously tested in the same series.

The contract or tendered price, as the case may be, of the standard coal is taken as a base, and the yield of gas per ton from the other coals is reduced to 14-candle power equivalent (corrected for temperature and barometric pressure). A unit value for the gas is then calculated by simple proportion from the cost price and 14-candle power calculated equivalent gas yield per ton of the standard coal. Thus, a standard coal costing 9s. 6d. per ton in the retort-house yields (say) 10,602 cubic feet (corrected) of 16·47-candle power gas per ton = 12,471 cubic feet calculated equivalent of 14-candle power. If another coal under test yields 10,208 cubic feet (corrected) of 15·3-candle power gas per ton, then its calculated equivalent of 14-candle power gas is 11,155 cubic feet, and the unit proportionate value of the gas ascribed to the coal under test is

$$12{,}471 : 11{,}155 :: 9\text{s. } 6\text{d.} : x \text{ and } x = 8\text{s. } 5{\cdot}97\text{d.}$$

Additions to, and deductions from, this unit gas value figure are then made for differences with the standard coal in *actual* yield of

gas (corrected) per ton, ash in coke, purification costs, and sulphate of ammonia calculated from ammonia in the crude gas only. The coke yielded for sale is ignored in this valuation, because if one coal yields less coke than another, it is safe to assume that it has given off a greater weight of gas and (or) tar, which are worth more than the difference in weight of coke.

A coal actually yielding 11,000 cubic feet of 14-candle power gas is more valuable to a gas company (other things being equal) than one yielding 10,000 cubic feet of 15·4-candle gas, when the prescribed illuminating power is 14 candles; and I allow 3d. per 1000 cubic feet excess or decrease in yield of gas per ton as against the standard coal yield for interest on capital, depreciation, and repairs of the carbonizing plant, on the grounds that more carbonizing plant is required for the lower gas-yielding coal. Carbonizing wages being more on the latter because stokers' wages are based on the work done, not on the gas yield, I allow for this item 2d. per 1000 cubic feet gas per ton difference with standard coal. For ash in coke, I allow 1d. for each 1 per cent. difference from the standard coal; whereby a coke containing 10 per cent. of ash is shown as worth 5d. per ton of coal less than another containing 5 per cent. The differences between sulphur impurities in gas from coal under test as against the standard coal are valued at purification costs. As the yield of tar and ammoniacal liquor cannot be ascertained, the quantity of ammonia in the crude gas at the outlet of the exhauster is converted into sulphate of ammonia equivalent, and the difference in yield as against the standard coal valued at the approximate selling price of sulphate, less cost of manufacture and bagging.

The result is an approximate comparative value of the coal under test delivered in the retort-house, as against the known cost of the standard coal, for the guidance of the engineer when making recommendations for purchase; and I suggest that truer values are obtained by this method than by taking the sperm value basis. Other items to which money values cannot very well be ascribed require, however, taking into consideration—including the behaviour of the coal in the retorts, effect on hydraulics and ascension-pipes, and character of the coke, all of which require noting during the test, and embodying in the engineer's final conclusions on the merits of the respective coals.

The accompanying statement shows the test figures and details of the comparative valuation of two hypothetical coals on the aforementioned basis, excluding the subsidiary items.

	Standard Coal.		Coal under Test.
Dates of working test	..	..	..
Duration of test hours	72	..	72
Coal carbonized, tons	269	..	304
Gas made—			
Cubic feet, corrected to 60° Fahr. and 30 in. bar	2,852,000	..	3,103,500
Per ton, cubic feet, corrected	10,602	..	10,208
Average illuminating power on the bar photometer	16·47	..	15·3
Calculated equivalent to 14-candle gas, cubic feet per ton corrected	12,471	..	11,155
Ash in coke, per cent.	11·45	..	6·32
Ash in coal, ,, ,,	7·50	..	4·21
CO_2 at outlet of exhauster, per cent.	3·00	..	2·30
CO_2 at station meter, ,, ,,	Nil.	..	Nil.
H_2S per 100 cubic feet in crude gas at inlet of purifiers, grains	1015	..	325
Sulphur compounds per 100 cubic feet at inlet of purifiers, grains	65·15	..	26·64
Ammonia per 100 cubic feet at outlet of exhauster, grains	241	..	217
Calculated equivalent sulphate of ammonia, pounds per ton	14·17	..	12·27

Valuation.

	Standard Coal. s. d.		Coal under Test. s. d.
Unit value only for gas on 14-candle basis —12,471 : 11,155 : : 9s. 6d. : x	—	..	8 5·97
Add or deduct for interest and depreciation, repairs, &c., on carbonizing plant, at 3d. per 1000 cubic feet on the difference in actual yield of gas per ton, corrected to 60° Fahr. and 30 in. bar.— 10,602 10,208			
394 at 3d. per 1000 cubic feet	—	..	− 0 1·18
			8 4·79
Add or deduct 2d. per 1000 cubic feet for carbonizing wages, calculated on the difference in actual yield of gas per ton, corrected to 60° Fahr. and 30 in. bar.— 10,602 10,208			
394 at 2d. per 1000 cubic feet	—	..	− 0 0·78
			8 4·01
Add or deduct for ash in coke 1d. for each 1 per cent. difference from coke of standard coal— 11·45 6·32			
5·13 at 1d.	—	..	+ 0 5·13
			8 9·14
Add or deduct for purification from H_2S, difference only, at 0·4d. per 1000 cubic feet— (10,602 at 1015 grains H_2S per 100 cubic feet) : (10,208 at 325 ditto) : : (10,602 cubic feet at 0·4d. per 1000 cubic feet) : x; and x − (10,602 cubic feet at 0·4d. per 1000) =	—	..	+ 0 2·94
			9 0·08
Add or deduct for sulphur compounds, difference only, at 0·5d. per 1000 cubic feet— (10,602 at 65·15 grains sulphur compounds per 100 cubic feet) : (10,208 at 26·64 grains ditto) : : (10,602 cubic feet at 0·5d. per 1000 cubic feet) : x; and x − (10,602 at 0·5d. per 1000 cubic feet) =	—	..	+ 0 3·22
			9 3·30
Add or deduct difference in sulphate of ammonia equivalent in crude gas at inlet to washer, at 0·86d. per pound— 14·17 12·27			
1·90 at 0·86d. =	—	..	− 0 1·63
			9 1·67
Net comparative values of coal to gas company, delivered to retort-house	9 6	..	9 1·67
Price tendered by colliery company, do.	9 6	..	9 6·00

GAS MANUFACTURE.

Carbonizing plant, methods of working, and results obtained, have undergone a vast change in recent years; the objects being to reduce working costs and increase the yield. These objects have been attained to a certain extent; but we recognize that there is still room for improvement.

A few years ago, the laborious hand stoking predominated in all but the large gas-works. To-day it is substituted in all but the very small works by machine-worked horizontals or inclined retorts; and these are now being overlapped, particularly on the Continent, by verticals and carbonizing chambers, both of which systems may claim to have passed the experimental stage—being now launched on the market for practical work. Those of us who have had the opportunity of inspecting the vertical retorts in Germany (I have had the privilege of being sent there twice by my Directors), recognize the transformation that this system makes in the retort-house. Of vertical retort installations, the German system appears at the moment to be the most practical; and the results achieved under German gas-making practice (which differs from British in respect of illuminating power tests being ignored) are extremely fascinating.

We in the North of England will hope to be favoured in the near future with an opportunity of seeing this new type of carbonizing plant in operation at Sunderland, where, under the control of our friend Mr. Drury, we know that the best results possible will be obtained from it conforming with local requirements.

My dream for some time has been that we may have gas made on the lines of continuous carbonization (the German method is intermittent), and have it purified in closed vessels which only require opening (say) once a year. Also that the consumer may be able to light his gas by simply turning a tap, without requiring either matches or a bye-pass, and that gaseous fuel shall substitute coal in the heating of the greater proportion of domestic dwellings.

Respecting continuous carbonization, the thanks of the gas industry are due to Messrs. Woodall and Duckham for their indefatigable work thereon. The mechanical difficulties which have beset their particular system appear to have been overcome; and meanwhile others are working at the problem on a practical scale also.

Respecting purification, Dr. Feld's centrifugal washer, as also the recent invention of Professor Burstall, of Birmingham University, claim to deal with the wet purification of coal gas. Many purifiers already have internal fitments for holding the purifying material lightly, thereby abolishing the changing of purifiers for excessive back-pressure only. Reversing the working sequence of the purifiers intermittently, has already been adopted in some gas-works, resulting in a reduction of the purifier changes. These factors, combined with partial revivification *in situ*, point to the accomplishment of closed purification in the true sense of the word, by using the aforementioned wet process and having oxide purifiers as catch boxes only.

The ignition of gas at the consumer's burner can be accomplished by sparks from an alloy already invented by Welsbach (of which I have personally had a small piece for some time); and the practical utility of this is only awaiting the application of a mechanical contrivance which the pressure of gas will operate on opening the gas-cock. This does not appear to be insuperable, having reference to those automatic lighters in public lamps already on the market which are operated by gas pressure.

The recent improvements embodied in gas-fire construction, whereby their efficiency has been considerably increased, should result in a considerably extended business being done in domestic heating, particularly if accompanied by differential prices for gas so used—this latter feature being worthy of careful consideration. Though these results have not, as yet, been collectively accomplished in practice, I feel justified in contending that they are all well past the laboratory stage, and that in the near future my dream will be realized by the assembling of them *in toto* in the same gas undertaking.

I am not in favour, however, of scrapping good workable existing carbonizing plant for the simple purpose of substituting any of the new carbonizing installations.

With machine-worked horizontal retorts, the innovation made by Mr. Charles Carpenter, and its application by Mr. S. Y. Shoubridge, Mr. Smith, of Stirling, and others, as to filling the retorts and allowing the requisite longer duration for burning-off the heavier charges, appears to easily beat everything previously accomplished in carbonizing results, conforming with British requirements. It is apparently a simple method of increasing the efficiency of existing plant at a minimum of cost, even if stoking machinery has to be installed to push out the coke; and my opinion is that it is the system to work on the general scale in preference to all others at the present time.

If extension or reconstruction of manufacturing plant is absolutely necessary, then the verticals and chamber retorts or ovens should, by all means, have full consideration, though as an alternative carburetted water gas plant can be installed at much less initial cost to stave off such extensions. The South Shields Company adopted the latter course, on my recommendation, instead of embarking on a reconstruction scheme at the Jarrow works; and with last year's depressed state of the coke market, and its immediate prospect little if any better, coupled with the unprecedented low prices of gas oil now ruling, I am more convinced than ever that, at any rate in my Company's case, the right thing has been done.

To the introduction of retort-house governors varied results have been attributed. My experience with a design of governor which I consider to be as good as, or better than, anything on the market, has only resulted in one advantage—viz., the maintaining of a constant and steady quality of the gas as made. But this, in itself, is sufficient to justify their adoption.

Coke-handling plant has always been a delicate question with me, by reason of the cost of upkeep and the vast amount of breeze usually perceptible in gas-works where coke conveyors and elevators are in use.

The Shields works have not hitherto had railway connection; but recently negotiations have been concluded for railway-trucks being hauled over adjoining private sidings from the Shields works to the North Eastern Railway.

Mechanical appliances are required for lifting the coke up on to the adjoining elevated railway sidings; and I recommended the adoption of the "Telpher" system for this purpose, and to extend it into the retort-house for handling hot coke. This type of plant, in my opinion, provides the most satisfactory method of handling coke, and involves a minimum of breeze being made. You will have an opportunity of inspecting this plant to-day, so far as it is completed. It is, I believe, the first case of adaptation to an inclined retort installation in this country.

Other matters that may be of interest to you at the Shields works are the arrangement for supplying breeze to the boiler-house, the grouping of the coal gas and carburetted water gas machinery in one room, the combined oil-storage tank and relief holder, the steel-framed block of buildings having only half-brick thickness walls, an office extension in artificial stone, luteless purifiers having overhead cover-lifting joists combined with a runway for handling the purifying material.

Before closing my remarks on manufacture, it may be mentioned that naphthalene troubles, formerly very prevalent at South Shields, have been reduced to a minimum by using special solvent oil in the Livesey washer situated immediately after the exhauster, and coupled with the use of just a small quantity of "Gazine" at the outlet of the station meter.

During the year ending June 30, 1902, with 15,000 consumers, there were 1477 complaints due to choked services. In the year ending June 30, 1909, the number of such complaints was reduced to 410—that is, 72 per cent. decrease, though the consumers have increased in the meantime to 26,685, or 77 per cent. increase.

RESIDUALS.

The market value of coke has, unfortunately, fallen during the past twelve months—due primarily to trade depression; while the lesser quantities required by cement works, due to foreign-made cement competing, has also made a considerable difference in the coke sales of this district.

Every gas manager should endeavour to increase the local sale of coke by specially catering for the domestic household trade, by which I mean kitchen fires. During several winters now, rolleys with sacks of coke have been sent out in this town to travel the same streets on corresponding days each week. A large lettered board is fitted to the rolleys, with price painted thereon, and cash is paid on delivery; each rolleyman hawking coke in the district allotted to him. Printed handbills have also been periodically delivered from house to house, drawing attention to the advantages of coke. A breaking and screening plant, with sack-filling arrangement, is being erected at Shields works, which will facilitate the further development of this trade.

Tar has further fallen in value, due to over-production arising from the bye-product coke-ovens erected by collieries. Some improvement may be expected from the increasing popularity of tar-sprayed roads, in connection with the dust problem and with the Budget proposals as to roads for motor traffic.

Sulphate of ammonia has kept up wonderfully well, and the Sulphate of Ammonia Association are considering what steps should be taken to prevent over-production of this valuable fertilizer ruining the price, by extending the markets, as also by the formation of a central selling agency. They are looking ahead to prevent disaster; and they ought to be financially supported by every works manufacturing sulphate of ammonia.

Respecting "Coalite," its claims are that of a smokeless fuel; but gaseous fuel is much simpler and more convenient to the user. If there is a market for "Coalite," then, inasmuch as it is a special class of coke, and gas is evolved in its manufacture, the ordinary gas-works is the place where it should be made. But the difficulty I foresee is that the gas is not of the quality now required for town supply, and that therefore the cost of "Coalite" as a fuel, excepting in very special cases, will most probably be prohibitive.

STRUCTURAL WORK.

The design, arrangement, and construction of gas-works plant and buildings necessarily varies according to the engineer's individual taste, the ground space available, and the locality in which the works are situate. Personally, I am averse to ornamentation in a gas-works, as it is unnecessary and increases the costs.

The Shields works provides a typical example, not to be emulated, of gas being made on a cramped site. While such a site lends plenty of scope for ingenuity in filling up every available corner and the grouping of plant compactly, it does not conduce to the cheapest working costs, nor does it by any means provide a show-place.

Steel-framed buildings, with half-brick panelling, are very suitable for gas-works; and apart from cost, they allow of plant being erected therein at the same time as the brickwork is being built. Reinforced concrete can also be utilized to very great advantage in gas-works structures; and I have adopted it in a variety of special cases for foundations, elevated floors, and walls. It could not, however, compete in point of cost with the half-brick panelling to the steel-framed building erected at the Shields works.

Artificial stone, as made by some processes, is obviously unsuitable for gas-works. I have adopted one particular make of it, however, in an extension of the offices; and though I abolished brickwork backing, the result is quite satisfactory—no trace of dampness being discernible. This extension comprised an additional storey and an area of 206 superficial yards of artificial stone, 9 inches thick throughout, with projecting imitation ashlar quoins and corbels, all to match the original building. The building is lined with plaster slabs, placed 1 inch clearance from the wall and secured with laths plugged to the wall. The cost of the artificial stone shell fixed complete, including plaster slabs, was £282, or 28s. 7d. per superficial yard; while in suitable local stone the cost, with the necessary brickwork backing and ordinary plaster, would have been about £380, or 38s. 9d. per superficial yard. The saving in this case was 25 per cent.

One feature in connection with structural, as also other work, that I do not believe in, is accepting in all cases the lowest tender. In most instances this can be done; but I am perfectly satisfied it is a mistaken policy often adopted. The competition that strains some contractors to tender at unremunerative prices; and when subsequently it is recognized that there are no extras to make the profit on, there is nothing but trouble and probably unsatisfactory work, even under the closest supervision.

DISTRIBUTION DEPARTMENT AND SELLING GAS.

The selling of gas—formerly neglected, so far as new business was concerned—is now our most important branch, owing to the keen competition that exists. Though we provide the cheapest and most efficient artificial light, this fact in itself is not sufficient; the public require telling so and telling often. Instead of reducing the price of gas to the lowest ebb, it is better to charge a little extra and spend more on educating the public as to the utility, advantages, and cheapness of gas for lighting, cooking, heating, and power; also on maintaining gas apparatus in the highest state of efficiency.

Continuous advertising, in one form or another, is of the utmost importance. Intelligent canvassers, meter inspectors, and gas-fitters can do a lot; but they require augmenting by the distribution of suitable printed matter, pithy notifications on accounts, demonstrations, show-rooms, maintenance of incandescent burners on consumers' premises, and prompt attention to consumers' complaints. These are the lines on which the South Shields Gas Company are endeavouring to run; and though we have had a show-room in South Shields for several years, and are continuing it, another permanent show-room coupled with a Branch Office for the payment of accounts, receiving orders and complaints, and showing gas apparatus, has just been opened at Jarrow for the convenience of the consumers in that part of the district of supply. Incandescent burner maintenance should be made a special feature—recognizing that a satisfied consumer is the very best advertisement. Free maintenance has been in operation here for two years now, with most satisfactory results.

While lighting is the mainstay of our business, the popularity of cooking by gas has extended enormously in recent years, even into the poorest houses, through the medium of slot installations. There is, however, a vast field, practically unworked as yet, in the heating of rooms; also in hot water circulating systems for dwelling houses. These are features that require specially catering for now. The recent application of more scientific principles in the construction of gas-fires has improved their efficiency considerably; and this should be demonstrated to the public.

Good pressures are essential for incandescent gas lighting,

cooking, and heating. It does not follow that higher pressures mean increased unaccounted-for gas, providing the distributing system is properly maintained and renewed when necessary. Though the initial pressures at our works have been increased so as to give 25-10ths on the outskirts of our district, as against 15-10ths nine years ago, the unaccounted-for gas has fallen during the same period from 12·4 to 5·17 per cent.

Instead of altering the mechanism of slot-meters (which could easily have been done by change wheels) when the price of gas was last reduced, I recommended that they be left unaltered, and that instead a rebate be given to the consumers each time the collector called. The system has given entire satisfaction, and is very popular with the consumers; the rebate corresponding with the dividend of the Co-operative Stores.

The changing of slots for ordinaries and *vice versâ* is apt to become a costly and serious business; but enforcing a charge for fixing ordinary meters in such cases has had a beneficial effect here. One consumer was foolish enough to contest such a charge; but the magistrates ordered him to pay.

The multitude of incandescent gas-lamps, burners, fittings, and mantles now on the market has become somewhat bewildering; but, nevertheless, it is advisable to obtain samples of new patterns from time to time, and test them for higher efficiencies. It is necessary, however, to deprecate the cheaper outside enamelled steel-lamps, owing to their short life, which in some cases has not exceeded two years.

Most local authorities, even those who own electricity undertakings, now openly recognize that incandescent gas is much more satisfactory and cheaper than electricity for public lighting. In recent years I have succeeded in inducing five of the local authorities whom we serve, to scrap every flat-flame public lantern, and substitute, at their own cost, incandescent gas-burners with suitable new lanterns. The Gas Company undertake the upkeep and maintenance of the whole of these lamps, numbering 3122, at inclusive rates for gas, lighting, cleaning, repairs, and upkeep. The lamplighters attend to the mantle renewals, and a record is kept of mantles used per lamplighter and averages per lamp.

A large number of mantles have been experimented with both in the laboratory and in the street-lamps; and the best results are being obtained from a mantle having a metal top ring and a metal fork, which fuse together, thereby providing greater rigidity for the mantle on the upright burner. Twelve months experience with this type of mantle proves the saving of over 60 per cent. in the number of mantles used, as against those formerly employed—a well-known make and more expensive, but which far exceeded my estimate of the number required for maintenance.

Automatic pressure-wave lamp-lighting appears more suitable for some districts than others; and its extensive adoption depends to a great extent on the attitude taken up by lamplighters, who, if wise, will be satisfied with reasonable terms under present conditions.

The ventilation of inhabited rooms and buildings is a matter entitled to much more consideration than it receives. Building bye-laws and regulations ought to compel the fixing of ventilators in living rooms. Meanwhile, gas engineers should advise consumers on ventilation, and urge the distinct advantages which gas possesses over electric light for aiding it.

Electric light has always been more expensive than gas, is so to-day, and will continue so in the future, in my opinion; and electricians have no justification for assuming otherwise. The relative cost to small consumers of gas and electric light in this town works out at 3¾ to 1 in favour of gas, *plus* a further saving in renewals, taking the low-pressure inverted incandescent gas-burner as against the most efficient electric lamp—viz., the Osram. For cooking and heating, electricity is hopeless in point of cost comparatively with gas. For power, gas is also cheaper, except where electricity is supplied at special cut-prices as in some cases on Tyneside, where electrical competition is probably keener than any other part of the country.

COMMERCIAL SECTIONS.

In recent years, what have been termed Commercial Sections have been inaugurated by almost every District Gas Association other than our own. Personally, I consider the title rather a misnomer, having reference to the class of work and variety of matters dealt with. But having had an opportunity of perusing some of the annual reports, and discussing the matter generally with several who have experience in the matter, I am personally satisfied that the members of this Association and the undertakings we represent can be considerably benefited by starting such a section in the North of England. There are many questions which, even if there were time, it is not advisable to raise or discuss at the half-yearly meetings, but which could be freely dealt with at (say) monthly meetings of the section. I had intended dealing with the matter rather fully in this address, but time would not permit. It is, therefore, my intention to lay it before the Committee, with the object of having a report submitted to you for consideration and discussion at your next meeting.

I have now expressed my views on some of the matters foremost in my mind connected with the gas industry, and conclude with a word of apology. It is that while many of you are familiar with the subject-matters referred to, it is desirable that the outside public should learn something of gas men's views on the present and future of the gas industry; and a presidential address seems to offer a suitable opportunity.

Mr. W. Ford (Stockton) expressed the opinion that, from the able and extensive address to which the members had listened, they could only think over it and say: "Well done, good and faithful servant, thou deservest our warmest commendation;" and to the President he must express his personal thankfulness that he was able to give them such information generally upon their great industry. He hoped it would benefit the young as well as the aged. He himself had received a great amount of information, which he should take home with him and digest in his leisure hours. In these simple words he proposed that the members should give a hearty vote of thanks to the President for his very elaborate and worthy address. He would ask Mr. Thomas Hardie to second the motion; and, in doing so, he might take the opportunity of congratulating him upon entering into the eminent position of Chief Engineer to the capital gas-works of the North of England. He hoped Mr. Hardie would be long spared to fill this position with the eminent abilities he possessed.

Mr. T. Hardie (Newcastle) said that he had much pleasure in seconding the vote of thanks. Their President had a personality of his own. He thought that, in the closing paragraph of the address, he gave this feeling, in his own words. They had had an address which simply bristled with his individuality. He (Mr. Hardie) felt rather glad that the President had not given them more; but he was sorry he did not read the whole of his address. There was this advantage, perhaps, in this—that they would have to go back to the address and read it all for themselves. It would really be a necessity that they should do this, because so many of the views expressed by the President opened up matters which he was sure would require considerable time for digestion. Perhaps he might be permitted to thank the President and Mr. Ford for their kind references to himself; and also the members for the manner in which they had received them.

The motion was very cordially agreed to, and the President briefly returned thanks.

PRESENTATIONS TO MR. W. DOIG GIBB.

The President, addressing Mr. W. Doig Gibb, late Chief Engineer to the Newcastle and Gateshead Gas Company, said it was now his privilege and pleasure to present to him, on behalf of the North of England Gas Managers' Association, a solid silver tea and coffee service, on the occasion of his sphere of labour being removed from the North to the South of England. They asked him to accept these gifts as "a token of sincere esteem, and an appreciation of the services he had rendered to the Association during the eighteen years he had spent in the district." They knew he would not judge the gift by its intrinsic value, but that what would be far more gratifying to him would be the fact that practically every member of the Association had perfectly voluntarily subscribed to the presentation fund. They congratulated Mr. Gibb most heartily on the honour which had been conferred upon him in his appointment to the "plum" of the gas engineering profession. His ability as a gas engineer and as a gas expert was recognized throughout the country; but they in the North of England knew particularly that the choice of the South Metropolitan Gas Company had been a wise and a happy one, and that Mr. Gibb would be a credit both to them and to himself. The mention of the South Metropolitan Gas Company was always accompanied with one prominent matter, which was inseparably bound up with it—viz., co-partnership. The two were synonymous terms. The cordial relations between Mr. Gibb and his workmen, and his consideration for their interests, combined with his uniform courtesy and general good-fellowship, had always been a special feature in his career. The promotion of a rifle club among the Newcastle Gas Company's workmen was an instance of the interest he had taken in their welfare. Such good feeling as this was the basis of co-partnership, as he understood it; and the South Metropolitan Gas Company's workmen would very soon recognize and appreciate the considerate Chief who was going among them. He would go further, and say that the Southern gas engineers would have a professional brother among them whom it would always be a pleasure to meet. He apologized for the inadequacy of his remarks, particularly when there were so many present who could have done much fuller justice to Mr. Gibb than he. But he would give one sentence which expressed the general view, and that was that they were exceedingly sorry to lose him. They were desirous that Mrs. Gibb should also have a *souvenir* of these proceedings; and he asked Mr. Gibb to accept the silver salver which was also on the table, on her behalf, as a memento. They wished him every success in his new surroundings; and they hoped he would be blessed with long life and happiness to enjoy the use of the gifts which he (the President) now formally handed over to him.

Mr. Gibb, in acknowledging the presentation, said there were some occasions when it was quite impossible to put into words what one felt. He thanked the members all very, very sincerely for their kindness in making him so handsome a present. It would be regarded as an heirloom in his family, and be handed down, he hoped, to his sons, and most probably to their sons. The President had been all too kind in what he had said about him. But there was one thing which, since it became generally known that he was going South, had been a source of very great gratification to him; and that was that the Newcastle workmen, the Newcastle officials, the North of England

Gas Managers' Association, and everyone with whom he had been connected, seemed to think that he had been, at all events, a real friend. This was very gratifying to him. The President had mentioned intrinsic value; but this was quite a secondary consideration. Though he had reason to know that the gift which he had received that day was of great intrinsic value, this, after all, was of secondary importance compared with its being such a tangible token of their regard for himself. And if anything could spur him on to do the very best he could in the South, it was the knowledge that his future career would be watched so carefully, and with so much love and esteem, by the hundreds of friends he was leaving behind him in the North. The President had referred to the co-partnership which existed in the South Metropolitan Gas Company; and he (Mr. Gibb) was going forward with eagerness—he might almost say with joy—to take part in this movement, because he so very thoroughly believed in it. It seemed to him that if such relations as had evidently existed between himself and the workmen of the Newcastle Company were sought for, there ought not to be very much difficulty in co-partnership being gradually established throughout the country, because it was quite certain that between himself and the workmen there had been very numerous expressions of kindness, which was—he was sure that in very many of their own cases also there was at least the preliminary stage, which must be there first—co-partnership of hearts. He could not say more beyond thanking the members, and he did so very sincerely, and trusted they would take it from him that it was sincere and from his heart. He also thanked them on behalf of his wife.

The gifts, as mentioned by the President, consisted of a silver tea and coffee service and a silver salver. On the service there was the following inscription:—

> Presented to W. Doig Gibb, Esq., M.Inst.C.E., by the North of England Gas Managers' Association, on his appointment as Chief Engineer to the South Metropolitan Gas Company, as a mark of esteem, and in appreciation of his services to the Association. 2nd October, 1909.

The inscription on the salver was to the same effect.

Mr. J. W. Helps (Croydon), the President of the Institution of Gas Engineers, said he was particularly glad the President had asked him to make a few remarks, because he was one of those who came from the South, and who, in a short time, would be one of the gainers by what they in the North had lost. He did on this occasion most heartily welcome Mr. Gibb to the South. He felt sure that every engineer in that part of England would only be too glad that Mr. Gibb was coming to join their ranks. They had, of course, during past years, watched Mr. Gibb's career. They knew that in him the gas industry had one of its ablest supporters and one of its finest engineers; and they felt sure that the strength of their position in the South would be considerably added to by his advent among them. He (Mr. Helps) had had the pleasure personally of knowing Mr. Gibb for a very long time; and he recognized not only his great ability but his goodness of heart, and his generous, noble, and sportsmanlike character. He always laid a great deal of emphasis on the word "sportsman;" and he thought that if there was anyone who could claim to be a real sportsman, it was his friend Mr. Doig Gibb. He welcomed him to the South, not only because of his ability, but because he knew they would have a good and true man there, and one who would work ably and well with them. He (the speaker) was very glad indeed to have the opportunity of saying these few words; and he most heartily congratulated Mr. Gibb on the presentation which had been made to him that day, and on the tokens of satisfaction and affection which had been shown by every member of the Association to him that day.

Mr. Alex. Wilson (Glasgow), having been called upon by the President, said he was very glad also to have the opportunity of congratulating Mr. Gibb on his new appointment. He was a very old friend of his. It was quite to be expected by anyone who knew the abilities and the capabilities which lay within him, that Newcastle would not hold him all his days. Mr. Helps had put the matter so nicely that really he could not say much more; but he was in this position, that they lost Mr. Gibb, first of all from Scotland, when he went south to Newcastle, and now he was going to London, where he hoped he would reach a higher pinnacle of success than he had ever had in the past. He wished him all success in his future career.

The President said he was quite sure that there were many more present who would like to say a word or two relative to Mr. Gibb's removal from the North of England. Unfortunately, however, they had a time-programme to work up to, and it would not permit of that.

This concluded the business of the meeting.

Visit to the Gas-Works.

The members paid a hurried visit to the works in Oyston Street, a description of which is given later.

The Dinner.

At two o'clock, a company of about 180 were entertained to dinner by the South Shields Gas Company in the King's Hall of the Golden Lion Hotel. Dr. J. F. Armstrong, J.P., occupied the chair.

The toast of "The North of England Gas Managers' Association" was proposed by Mr. J. Redhead, the Vice-Chairman of the South Shields Gas Company.

The President, in responding, commented on the presence, as being unique at a meeting of a District Association, of the President and the two Vice-Presidents of the Institution of Gas Engineers.

Mr. T. Bower (West Hartlepool) proposed "Kindred Associations;" and the toast was responded to by Mr. J. W. Helps, the President, and Messrs. Alex. Wilson and R. G. Shadbolt (Grantham), the Vice-Presidents, of the Institution of Gas Engineers. Mr. Helps said that at present the Institution had, in the Parent Association and the District Associations, a duality; he wanted a trinity, by securing for the gas industry, through the Institution, the interest of directors and secretaries of gas companies and of members of corporations.

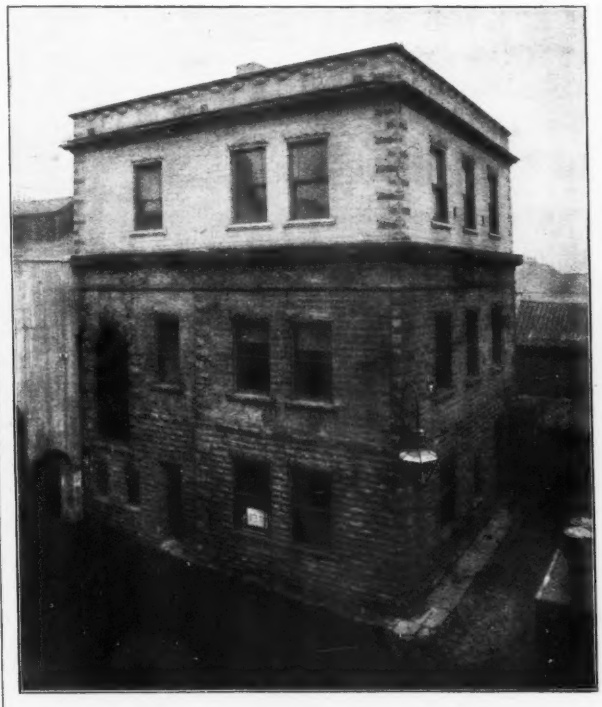
Mr. W. Doig Gibb proposed "The Chairman and Directors of the South Shields Gas Company." In his remarks, he said that their worthy President went to South Shields in 1900, and, as a neighbour, he, as quickly as possible, went down to greet him, and to offer his help—at all events, his friendship. He was not revealing any secret, after the remarks of Mr. Redhead, when he said that he was absolutely appalled, in walking through the works, at the task Mr. Duxbury had in prospect. Between 1900 and 1909 there had been a complete revolution in the history of the Company. From 1899 to 1901 the profits of the Company were not sufficient to pay the full dividend; but from 1901 to the present time the full dividends had been earned, and a little over. In 1900, carbonizing costs were 5d. per 1000 cubic feet; in 1908, they were reduced to 2·06d. In the same time the gas sold per ton of coal had been increased by 1060 cubic feet. Leakage had been reduced from 12·40 to 5·07 per cent.; sulphate of ammonia had been increased by 6·30 lbs. per ton of coal; and 43 million cubic feet more gas had been sold per year, in spite of increased competition with electric lighting. All public lamps now had incandescent burners; and there were more slot-meters than there were ordinary. All this reflected enormous credit on the Engineer who had been in charge, and who, he felt, was worthy of their sincere congratulations for the way in which, in a comparatively short number of years, he had absolutely pulled the Company into a different place from what it was in before. But the Engineer could not have done what he had unless he had been absolutely backed up by the Chairman and Directors, whose health it was that he was proposing.

The Chairman acknowledged the toast.

The proceedings closed early, to allow the visitors to catch their homeward trains.

SOUTH SHIELDS GAS COMPANY & ITS WORKS.

History of the Company.



Engineer and Manager's Office—Showing Extension in Artificial Stone.

The South Shields Gas Company was formed in the year 1824 by a small private Company, for the purpose of supplying gas within the township of South Shields and Westoe. Subsequently, it was reconstructed; being registered under the Joint Stock Companies Act, 1856. In 1857, the reconstructed Company

applied for, and obtained, statutory powers, with £20,000 of original share capital and £20,000 of additional share capital—the dividend prescribed by the Act being 9 per cent. Power to borrow on mortgage a further sum of £9000 was also authorized. In the years 1867, 1879, 1886, and 1904, the Company obtained Special Acts authorizing the raising of additional capital, extensions of the area of supply, and further powers. The authorized capital of the Company is at present £441,500 in stock and £142,995 mortgage loans—a total of £584,495.

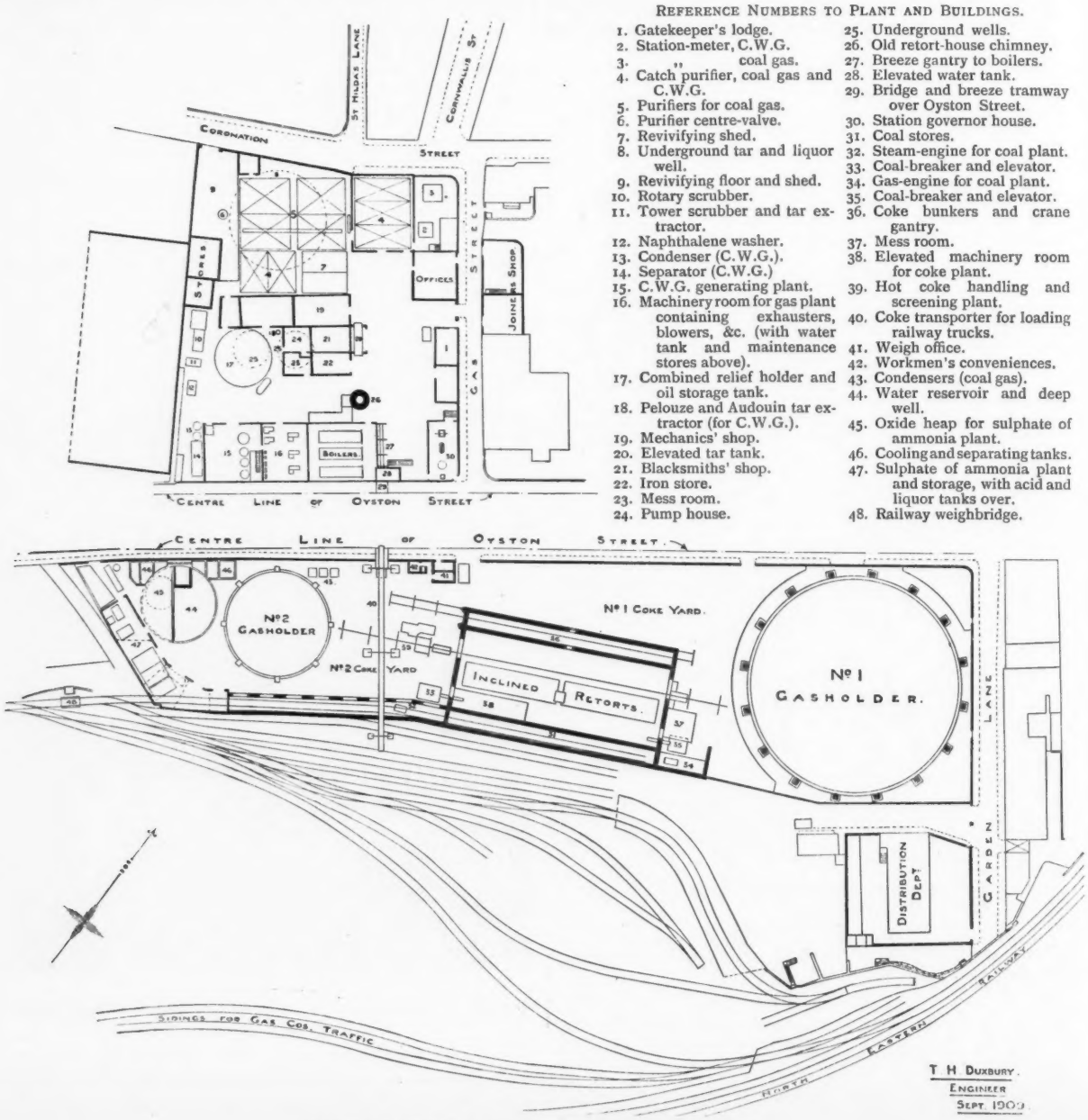
The Company's district of supply covers an area of about 25 square miles, comprising the county borough of South Shields, the borough of Jarrow, the parishes of Harton, Boldon, and Boldon Colliery, and portions of the urban district of Hebburn and the parish of Whitburn. The Company work, therefore, under the control of seven different Local Authorities so far as public lighting is concerned, and under four for street works.

The original gas-works were erected on part of the site occupied by the existing Shields works. In the year 1864, a small gas undertaking at Jarrow was purchased from a private Company, and, subsequently, it was reconstructed and considerably enlarged; thereby making the Jarrow works a larger manufacturing station than the then Shields works. The Company have continued to make gas at both the Shields and the Jarrow works; but in recent years the latter have only been used for gas manufacture during the midwinter season. An 18-inch trunk main connects the two works, which are situate 4 miles apart, and gas is sent through this main from either works to the other, as required, by the holder pressures, without the aid of any booster. By a simple arrangement of valves, this trunk main is utilized every evening as a distributing main; being connected to the station governors at each works.

In the year 1900, it was recognized that additional manufacturing plant must be erected at either the Shields or the Jarrow works; and it was eventually decided to construct a new retort-house at the Shields works. This new retort-house was partially constructed (for horizontal retorts), and the order for the roof had already been placed, when Mr. T. H. Duxbury was appointed Engineer and Manager to the Company. No arrangements had been made for the reconstruction of any of the gas plant and apparatus outside the retort-house; but as the old plant was both too small and in most parts in a bad state of repair, a combined reconstruction and extension scheme had to be taken in hand. This has been carried out in stages from the year 1901 up to date, and will be completed this year. Of the plant in use at the Shields works in 1900, only one holder, a tower-scrubber, a station-meter, and station-governor are in operation to-day.

The Shields Works.

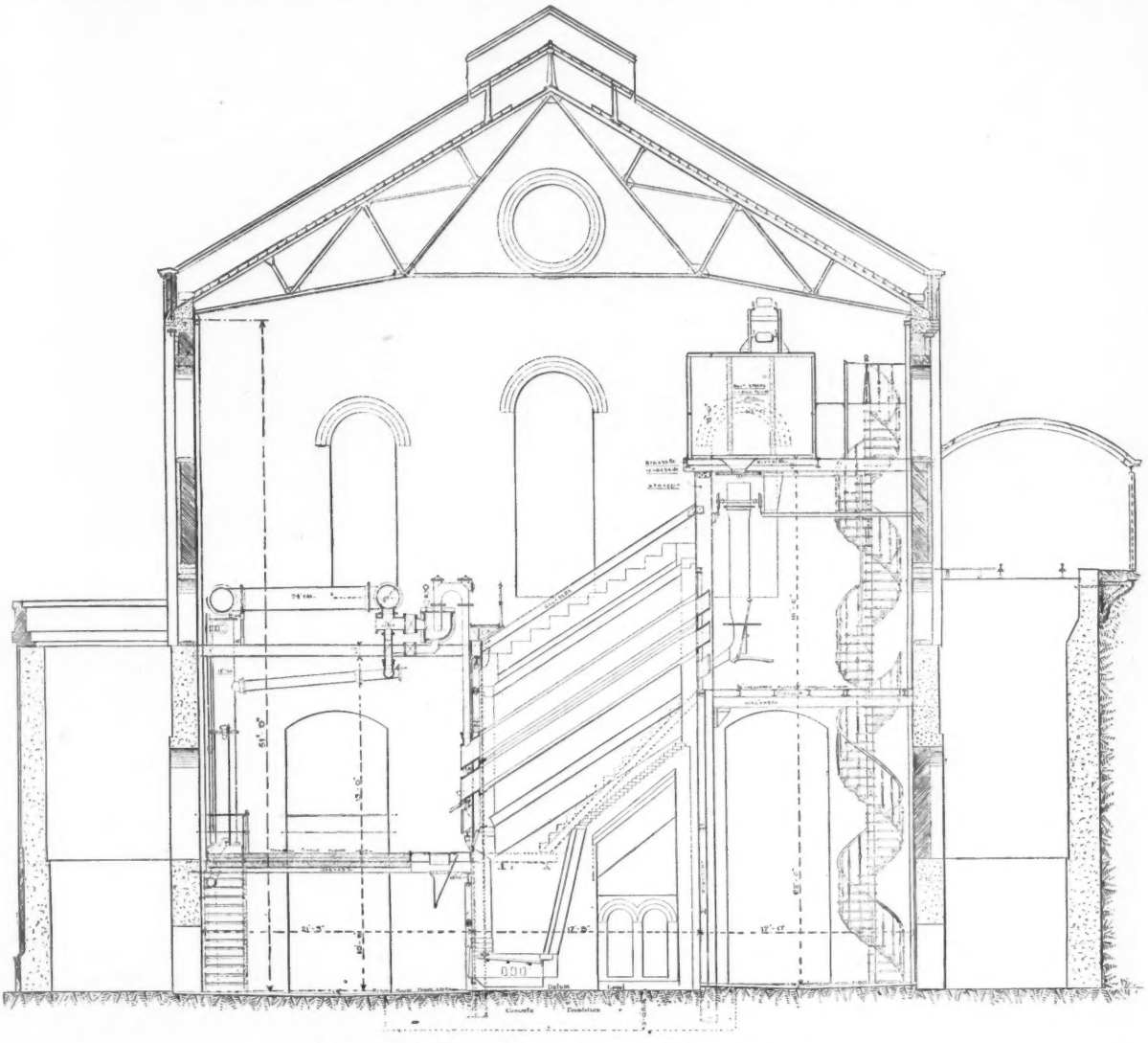
This account is not intended to deal with the innumerable and almost insurmountable difficulties that have arisen from time to time during the execution of the work, due to a section of the old plant having to be removed before new apparatus could be laid down. It is confined to a brief description of the Shields works as reconstructed and extended on the old works site, whereby the manufacturing capacity has been increased from 1 million to 2¼ million cubic feet of gas per day. The site is, unfortunately, divided into two portions by a public street; the joint area of the two plots of land being 2 acres 3 roods 15 poles. A block plan of the proposed reconstructed works was originally prepared by Mr. Duxbury; and this has been rigidly adhered to throughout in subsequent execution of the work. The Shields works have not hitherto had any direct railway communication, and a portion of the coal is carted from the Company's coal-store at the railway station to the gas-works by the Company's horses, at a cost



Reference Numbers to Plant and Buildings.

1. Gatekeeper's lodge.
2. Station-meter, C.W.G.
3. ,, coal gas.
4. Catch purifier, coal gas and C.W.G.
5. Purifiers for coal gas.
6. Purifier centre-valve.
7. Revivifying shed.
8. Underground tar and liquor well.
9. Revivifying floor and shed.
10. Rotary scrubber.
11. Tower scrubber and tar extractor.
12. Naphthalene washer.
13. Condenser (C.W.G.).
14. Separator (C.W.G.)
15. C.W.G. generating plant.
16. Machinery room for gas plant containing exhausters, blowers, &c. (with water tank and maintenance stores above).
17. Combined relief holder and oil storage tank.
18. Pelouze and Audouin tar extractor (for C.W.G.).
19. Mechanics' shop.
20. Elevated tar tank.
21. Blacksmiths' shop.
22. Iron store.
23. Mess room.
24. Pump house.
25. Underground wells.
26. Old retort-house chimney.
27. Breeze gantry to boilers.
28. Elevated water tank.
29. Bridge and breeze tramway over Oyston Street.
30. Station governor house.
31. Coal stores.
32. Steam-engine for coal plant.
33. Coal-breaker and elevator.
34. Gas-engine for coal plant.
35. Coal-breaker and elevator.
36. Coke bunkers and crane gantry.
37. Mess room.
38. Elevated machinery room for coke plant.
39. Hot coke handling and screening plant.
40. Coke transporter for loading railway trucks.
41. Weigh office.
42. Workmen's conveniences.
43. Condensers (coal gas).
44. Water reservoir and deep well.
45. Oxide heap for sulphate of ammonia plant.
46. Cooling and separating tanks.
47. Sulphate of ammonia plant and storage, with acid and liquor tanks over.
48. Railway weighbridge.

PART BLOCK PLAN OF SHIELDS GAS-WORKS.



Section of the Inclined Retort Installation at the Shields Works.

of 6d. per ton. The remainder is obtained from an adjoining colliery over a private siding, which runs into the coal-stores next to the retort-house.

Coal-Stores and Retort-House.—The capacities of the coal-stores are 1000 tons adjoining the retort-house, and 900 tons at the railway station; while the elevated bunkers inside the retort-house contain 240 tons—giving a total coal storage of 2140 tons. The retort-house is 150 ft. 6 in. long, 56 ft. wide, and 52 ft. high to the eaves, and is constructed of concrete walls to a height of 26 feet above the ground-level, as designed by the late Mr. W. J. Warner. The superstructure which was requisite for the accommodation of inclined retorts was designed by Mr. Duxbury, and built in plate bricks. A coal-store runs the full length of the retort-house on one side, and coke-bunkers are arranged on the other side; the latter having been adapted for this purpose because they were not required for coal.

The retort-house contains two benches of inclined retorts, each containing six beds of eights; the retorts being 20 ft. long and 24 in. by 16 in. ⏢ section, parallel throughout. The gas is taken off from the bottom mouthpiece by 7-inch diameter ascension pipes. Each bed of retorts has a separate hydraulic main. These are supported in front of the bench by cross girders extending from the bench bracing to the retort-house side walls. There are four tar-towers; one being used for three beds of retorts. There are two 12-inch retort-house governors on the foul main, situated directly in the centre of the retort-house. The producing capacity of the retort-house is 1,536,000 cubic feet per twenty-four hours, with six-hour charges.

Coal-Handling Plant.—Coal from the adjoining colliery is brought over the elevated railway siding in bottom-door waggons and dropped into a 100-ton capacity bunker which feeds the breaker; or the waggons can be taken further along and emptied into the coal-stores. Coal carted from the railway station is tipped from the carts direct into either of two breakers. The coal-handling plant comprises a unique arrangement of duplicate breakers and elevators, one at each gable end of the retort-house, with a reversible band conveyor running along the ground floor adjoining the coal-store, for feeding coal into either breaker. A push-plate conveyor extends the full length of the retort-house over the elevated steel-plate coal-hoppers, and receives coal from either of the elevators. One of the elevators is driven by a gas-engine, and the other by a steam-engine; and a neat arrangement of gearing and clutches enables the coal-conveyors to be worked from either elevator.

Coke-Handling Plant.—A coke-handling plant is now nearing completion, comprising a low-level Telpher, which will take skips containing hot coke from the front of the retorts and deliver them outside at either end of the retort-house. Two quenching tanks are provided into which the skips will be slowly immersed, and drenching of the coke thereby prevented. At one end of the retort-house there is a breaking and screening plant for the preparation of domestic coke, into which the Telpher can deliver the newly-quenched coke, or it can take it forward and deposit it into the coke-yard at either end of the retort-house. The coke-breaker is of special design, fitted with adjustable rollers, and has been covered by letters patent.

At present, hot coke is dropped into barrows in the retort-house basement, quenched, and wheeled out to the yard, where it is tipped into skips and lifted and stacked by a locomotive steam crane. The crane travels on a track laid over concrete bunkers, and delivers coke therein for loading carts. With the new arrangement now being constructed, the existing locomotive crane gantry is being extended so as to allow of the crane being utilized for picking up coke-skips from the low-level Telpher at either end of the retort-house, and delivering it into the coke-yard beyond the range of the Telpher. The locomotive crane will also deliver either broken or unbroken coke into the existing and additional coke-bunkers, and breeze into a small hopper feeding a tipping buggey on the boiler-house gantry.

The extension of the crane gantry is by steel structures; and a hopper is constructed therein, fitted with a special arrangement for measuring and filling broken coke into sacks. Coke loaded on to rail has hitherto had to be carted to the railway station; but arrangements have now been made for trucks to be brought into the Shields works over the adjoining Colliery Company's private sidings. As these sidings are some 32 feet above the yard level, mechanical appliances are necessary for lifting the coke; and a high-level Telpher plant is now being erected to deal with it. The high-level Telpher runs at right angles to the low-level Telpher, and can take skips of quenched coke from it and deliver

Inclined Retort-House, with Roof over Coal-Stores, as seen from the Elevated Sidings.

it into railway trucks or into the coke-yard. It will also lift coke from stock and deliver it into railway trucks at the rate of 220 tons per working day. A special steel-framed carriage has been designed (and made locally) for hauling skips of coke from any part of the coke-yard to within range of the high-level Telpher.

The Telpher plants are electrically operated. Electricity for this purpose is generated on the works, with duplicate sets of Siemens dynamos, belt-driven by gas-engines. Each generating set is suitable for driving either of the Telpher plants.

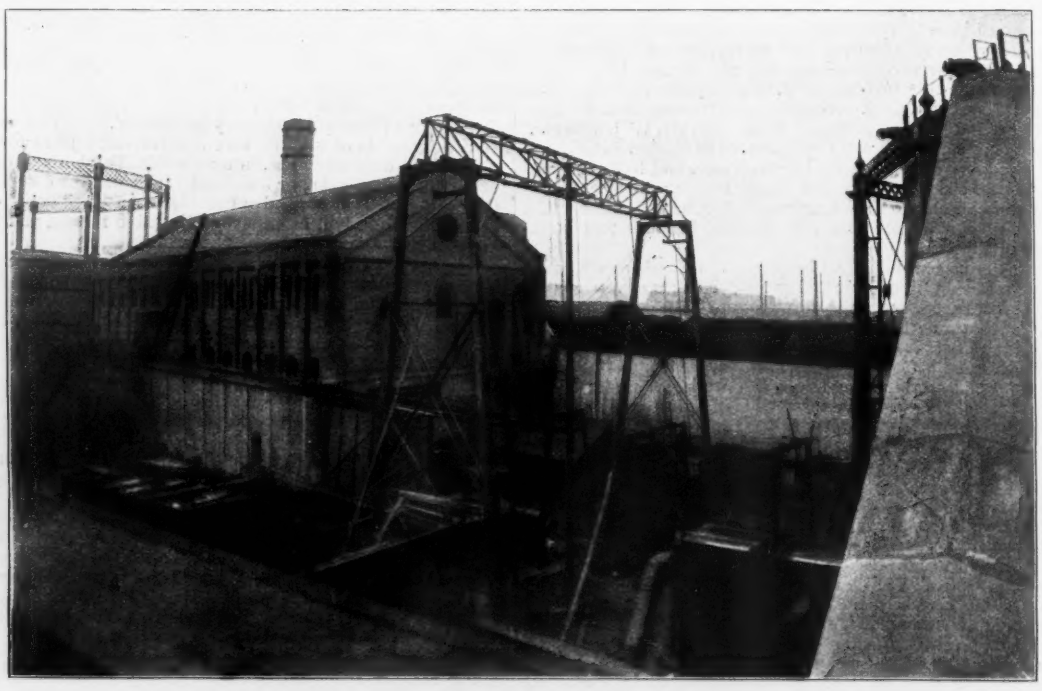
Condensers.—The condensers consist of a battery of three towers, water-tube type, and have a capacity of 1½ million cubic feet of gas per twenty-four hours.

Exhausters.—These are fixed in a machinery room embodied in a range of buildings comprising carburetted water-gas generating house, machinery room, with incandescent maintenance stores and water-tank over, and boiler-house. The assembling in the one room of the exhausters with carburetted water-gas turbo-blowers and pumps enables one attendant to control the whole of this machinery. There are three sets of rotary exhausters, all direct driven; one being for coal gas, another for carburetted water gas, and the intermediate one is so connected that it can be used as a duplicate for either. No. 1 exhauster is of Waller's four-blade rotary type, of 70,000 cubic feet per hour capacity. No. 2 is of Gwynne's make, but converted by Messrs. Waller and Son into a four-blade, having a capacity of 80,000 cubic feet per hour. No. 3 is Gwynne's make, of 45,000 cubic feet per hour capacity, and used exclusively for carburetted water gas.

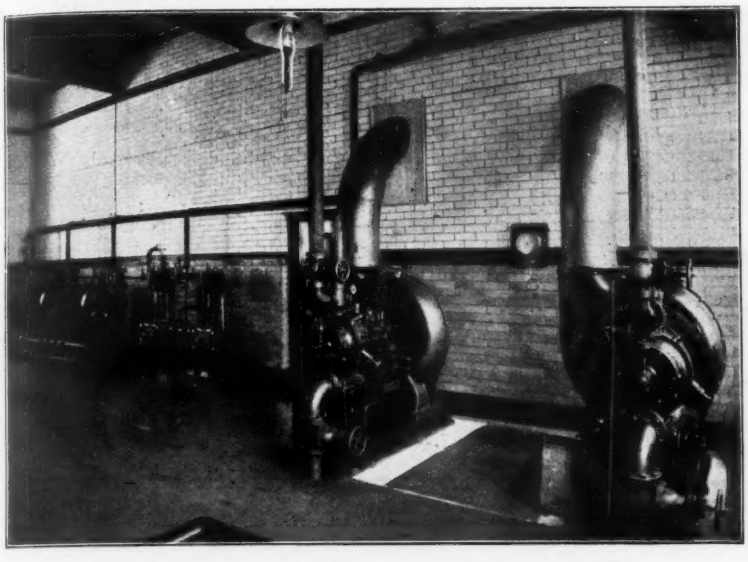
Boilers.—There is a battery of three Lancashire boilers, all fitted with forced draught; and practically the whole of the breeze made is used by the boilers on the works. They are 30 ft. long by 8 ft. diameter, and one is always off for cleaning. The old retort-house chimney is utilized for these boilers. Breeze is delivered to the front of the boiler-house by a tipping buggey running on a gantry, which connects the retort-house yard across a public street with the boiler-house yard.

Washers and Scrubbers.—The washing and scrubbing plant comprises a naphthalene extracting washer of the Livesey type (in which solvent oil is used), a tower-scrubber filled with thin boards and having a tar-extractor fitted in the base, and a rotary scrubber of the brush type. The tower-scrubber was used in the old works, but has been moved to a new position and refitted.

Purifiers.—There are nine purifiers in all; six being used for coal gas (four oxide and two catch boxes), and the remaining three for carburetted water gas. The purifiers are arranged in three batteries, with division plates subdividing them. All of them are of the luteless type, fitted with "New Century" covers and "Eclipse" joints. They are elevated on steel substructures, so as to provide oxide revivifying space underneath. The four oxide boxes are worked with a four-way dry-faced centre valve, the two carburetted water-gas boxes by separate slide-valves, and the three catch boxes having "Milbourne's" patent internal valves fitted. The sizes of the purifiers are as follows: Four of 35 ft. by 25 ft. by 5 ft. 8½ in. deep; two of them being fitted with Spencer's hurdle grids, and the other two having gas entering



Part of the Framework of the High-Level Telpher during Erection.



Carburetted Water Gas Turbo-Blowers and Pumps in the Machinery Room.

in the centre between two layers of oxide on ordinary grids. The carburetted water-gas purifiers, for oxide only, are each 30 ft. by 20 ft. by 6 ft. deep. The catch boxes are 40 ft. 6 in. by

Range of Steel-Framed Buildings—Walls Half-Brick Thick.

16 ft. 6 in. by 6 ft. 6 in., and are fitted with ordinary grids. Oxide revivification is carried out under the purifiers and in two revivifying sheds.

The purifying material is lifted by an elevator, which delivers either through a canvas shoot into two of the purifiers or on to a band conveyor for the others. The band conveyor delivers into the oxide purifiers or into skips travelling on a runway, which is utilized for lifting the covers of the two carburetted water-gas boxes.

Station Meters.—There are two station meters—one new one, of 80,000 cubic feet per hour capacity, for coal gas; the other being one of the original meters, of 20,000 cubic feet per hour capacity, and now used exclusively for carburetted water gas.

Gasholders.—There are two gasholders—No. 1 having two lifts, with guide framework, and 1,406,530 cubic feet capacity, and No. 2, having three lifts, of 287,610 cubic feet capacity. This holder has a top lift flying clear of the guide framework, and was designed to give sufficient pressure to operate automatic street-lamp lighters by pressure waves, without the aid of a booster. The total storage capacity at the Shields works is, therefore, 1,694,140 cubic feet, and, with the Jarrow holders, represents about 85 per cent. of the daily gas sent out by the Company in midwinter.

Station Governors.—There are three station governors; one that supplies South Shields town, another the Jarrow distribution pressure main, and the third the shipyards and works along the riverside, on which a special pressure is carried for gas-power purposes. There is also a safety governor for preventing the district supply being shut off through the carelessness of a foreman in changing the holder valves. The governor-house is a detached building, and flanged branches are arranged on the pipe connections for the connecting of boosters whenever they may be required.

Tanks.—There are two overhead water-tanks of 9000 and 4210 gallons capacity respectively. No. 1 tank is employed for storing water pumped from a well and reservoir in the yard, and is used for coke quenching; No. 2 contains town's water, and acts as a storage boiler supply when (if ever) the town's water should be cut off temporarily.

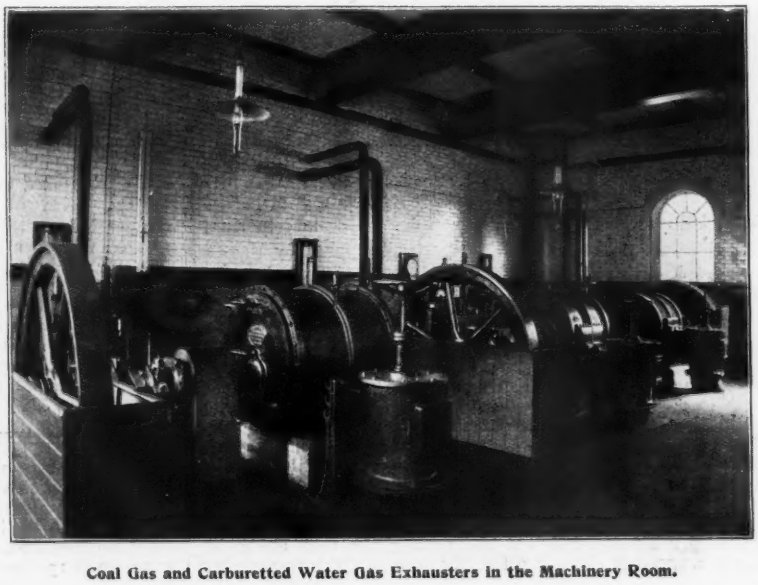
A former gasholder tank has been converted into a tar and liquor storage well, having a capacity of 274,000 gallons. There is also a smaller well, having a capacity of 25,000 gallons, used for liquor. At present, tar is pumped into an elevated tank and carted to the railway station; but in future this cartage will be abolished, and the tar pumped into railway trucks on the elevated sidings. The tar and liquor pumps are assembled in the original pump-house.

Sulphate Plant.—Sulphate of ammonia is manufactured on the works with a plant having a solid plate lead saturator and a daily capacity of 3 tons of sulphate. In addition to an ordinary purifier, an oxide heap is used for this plant.

Carburetted Water-Gas Plant.—This plant comprises one 650,000 cubic feet per day set of Messrs. Humphreys and Glasgow's make. Owing to lack of ground space, oil storage is arranged inside the relief holder, which arrangement has been perfectly satisfactory since an internal crown was fitted to the oil-tank. The plant is of standard type, but embodies the latest improvements, including direct-coupled steam-turbines to the blowers and a specially constructed Pelouze type tar-extractor, which effectually prevents the oxide in the purifiers becoming clogged with tarry deposit. The generating house is arranged to accommodate a duplicate set at any future time.

The combined relief holder and oil-tank is erected on top of an old tar well, which is retained for water storage, but which necessitated a reinforced concrete table foundation being constructed on four reinforced concrete piers, which were extended down to the rock at a depth of 18 feet below ground level. The concrete table itself is 18 inches in diameter, with reinforced concrete girders formed therein; the whole constituting a complete monolithic mass. Indented steel bars were used for reinforcement. The carburetted water-gas plant is only used intermittently, and is shut down entirely during the summer.

Workshops and Buildings.—The workshops comprise a joiner's shop, where carts and trolleys are repaired; a blacksmith's shop, fitted with two hearths and iron store adjoining; and a mechanics' shop, fitted with tools for executing all necessary repairs on the works. The workshops are houses in the old works buildings, which have been adapted to suit the respective requirements. The range of buildings containing machinery and carburetted water-gas plant is of steel-framed construction with half-brick thickness walls filled in. Half-brick pilasters are built in front of



Coal Gas and Carburetted Water Gas Exhausters in the Machinery Room.

the stanchions in the yard, whereby no steel work is visible from the outside.

The purifiers stand in the open without any buildings over them; in fact, the roof of the old purifier-house was removed before the new purifier was erected.

The offices at the works are occupied by the Engineer and his staff only—the Secretary's offices being situate in the centre of the town. They have recently been enlarged by the addition of another storey; this extension being carried out in artificial stone to match the original building. They provide accommodation as follows: Ground floor, Assistant-Manager, Distribution Superintendent, and clerks; first floor, Engineer and Manager's office and typing office; second floor, drawing office and laboratory.

The gatekeeper's lodge and weigh-office constitute separate buildings at the entrances of the works.

Stables, accommodating 23 horses, as also distribution department stores and workshops, are erected on separate sites.

The Contractors who have been engaged on the reconstruction work are as follows:—

Messrs. Drakes Limited: Inclined-retort installation and part of coal-handling plant.

Messrs. Graham, Morton, and Co.: Part of coal-handling plant.

Messrs. Strachan and Henshaw, with Messrs. Robert Dempster and Sons as Sub-Contractors: Coke-handling plant.

Messrs. Clapham Bros.: Condensers and five purifiers.

Messrs. Waller and Son: Exhausting plant.

Messrs. R. & J. Dempster: Livesey washer.

Messrs. W. C. Holmes and Co.: Rotary scrubber, also Western type double-faced gas-valves throughout the works.

Messrs. Ashmore, Benson, Pease, and Co.: Purifiers, steel framework for buildings, and combined oil-tank and relief holder.

Messrs. J. & J. Braddock: Station meter and governors, and retort-house governors.

Messrs. Humphreys and Glasgow: Carburetted water-gas plant.

Messrs. H. Greene and Sons: Schwab's sulphate of ammonia plant.

Messrs. Joseph Taylor and Co.: Solid plate lead saturator.

Messrs. Clayton, Son, and Co.: Three-lift gasholder.

Buildings: Local firms.

HANDLING GAS-COKE AT LIVERPOOL.

A Fixed Inclined Temperley Transporter at the Wavertree Gas-Works.

Coke Handling Plant at the Wavertree Gas-Works, Liverpool.

We give a reproduction of a photograph showing an important installation of a "Temperley Transporter," supplied by Messrs. Applebys Limited, at the Wavertree Works of the Liverpool United Gaslight Company. It constitutes a rapid and satisfactory method of handling hot gas coke.

The transporter is employed to convey quenched coke from the retort-house to the hoppers, from which it is delivered into railway waggons or carts. The transporter beam is of sufficient length to give a total transporting distance of about 282 feet; and it rises in this length about 22 feet. On this beam runs a Temperley patent double-purchase link-action traveller, which operates a Temperley patent automatic dumping fall-block. The coke is carried in automatic dumping coke-skips of special design. The transporter is driven by an electric winch designed for lifting a skip containing 5 cwt. of coke at a speed of about 200 feet per minute, and for transporting the load along the beam at a speed of about 500 feet per minute. The transporter is operated entirely by one driver, who from his cabin has perfect control over the various motions of lifting, transporting, lowering, and automatically tipping the skips and discharging the coke, and returning the empty skips and lowering them. The driver's cabin is so situated that he has a good view of his work at all stages; and an indicator is fitted in the cabin, within view of the driver, to show the position of the traveller on the beam at any time. The transporter, it is claimed, constitutes a most economical, rapid, and satisfactory method of handling hot coke in gas-works, &c.

For the purpose of calculations, the dead-weight of ferro-concrete structures is computed on the basis of actual volume including the reinforcement. As the quantity of metal rarely exceeds 3 to 4 per cent., the Hennebique practice, which has been approved by all engineers and constructors, is to take the weight of ferro-concrete at 150 lbs. per cubic foot.

An Epoch in Gas Manufacture.

DESSAU VERTICAL RETORTS

4022 already Ordered.

THE VERTICAL GAS-RETORT SYNDICATE, LIMITED,

are the Sole Licensees for the Erection of Installations on this System in the United Kingdom and the Colonies.

LETTERS PATENT No. 1393 of 1904 confer Exclusive Rights as follows:

"The Manufacture of Gas by subjecting Coal to distillation in a Vertical Retort heated to a higher temperature than is usually employed in Gas Manufacture so that Coke is formed from the internal walls of the Retort inwards and the Gas generated passes inwards and upwards through the central portion of the charge the Retort being charged with Coal up to the same level as that up to which the external heat is applied so that no space is left in which the Tar can quickly separate it being compelled to pass upward through the uncoked internal portion of the charge before leaving the Retorts substantially as, and for the purposes, hereinbefore described."

THESE RIGHTS HAVE BEEN UPHELD BY THE HIGHEST COURT OF LAW IN GERMANY

(See "JOURNAL OF GAS LIGHTING," July 13, 1909, p. 96.)

The first Installation in England has been erected at the SUNDERLAND GAS-WORKS, and will shortly be in Operation.

THE SYSTEM HAS NOW BEEN ARRANGED FOR ADAPTATION TO MODERATE SIZED WORKS.

Consulting Engineer: Mr. CHAS. HUNT, M.Inst.C.E.

Joint Sole Contractors { SAMUEL CUTLER & SONS, Millwall and Westminster.
GRAHAM, MORTON, & CO., Leeds.

For further Particulars, apply to the Secretary,

C. HOLMES HUNT,

17, VICTORIA STREET, WESTMINSTER, S.W.

NEW PATTERNS FIRES 1909-10

The "MADEIRA."

MOST ARTISTIC AND GRACEFUL IN DESIGN.

Fitted with Patent Non-Lighting Back Burner.

Supplied with double Fuel and Ordinary Grid Pattern Fire Bar as shown, or with Patent Single Row Fuel and Single Fire Bar as illustration of "Aden" below, as desired.

For Rooms up to 18 feet square.

Fire opening 12 in. wide.

Sizes over all:

22 in. Wide, 30 in. High, 9 in. Deep.

The "ADEN."

DESIGNED ON BOLD AND ARTISTIC LINES.

Fitted with Patent Non-Lighting Back Burner.

Supplied with Patent Single Row Fuel and Single Fire Bar as shown, or with double Fuel and Ordinary Grid Pattern Fire Bar, as illustration of "Madeira" above, as desired.

For Rooms up to 18 feet square.

Fire opening 12 in. wide.

Sizes over all:

22 in. Wide, 30 in. High, 9 in Deep.

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AN AMERICAN VERTICAL-RETORT BENCH.

The Daniel R. Russell Patent.

Under date of Aug. 9 (No. 930,494), the American Patent Office has issued the specification of a patent granted to Mr. Daniel R. Russell, of St. Louis, Mi., for "new and useful designs in connection with vertical-retort benches." The "American Gaslight Journal" of the 20th ult. reproduced the text of the specification (with the drawings); and the following particulars were obtained from the columns of our contemporary.

The patentee's object is to provide means by which the heating of the various parts of the retorts can be independently regulated, so that the highest temperature may be had at the centre or at either end of the retort.

The furnace A has communicating with it a flue B, for conducting the heating gases to the various combustion chambers C by means of the passages D. The heating chambers (six in number) are formed in pairs, by means of passages E. Each pair of chambers thus constitutes a set connected together, but entirely independent of the other sets. Passing through the various chambers are vertical retorts F, which, in the furnace shown, are four in number.

In order to insure the circulation of the heated gases around the retorts, each of the chambers C is provided with a pair of short baffle-walls connecting the front pair of retorts with the front portion of the furnace; another pair of baffle-walls connecting the front and rear retorts. These latter are provided with passages G, and also with a pair of inwardly projecting baffle-walls H. While each set of combustion chambers is thus provided with two gas inlets, a single outlet only is provided for the gases from the two chambers constituting a set. This outlet I communicates with a set of recuperator flues J. The sets of these

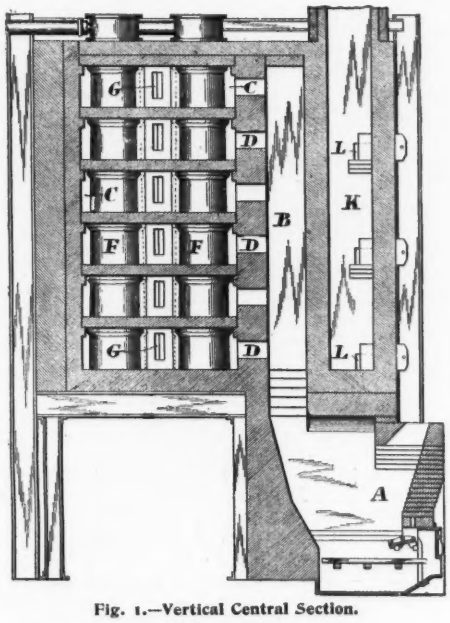


Fig. 1.—Vertical Central Section.

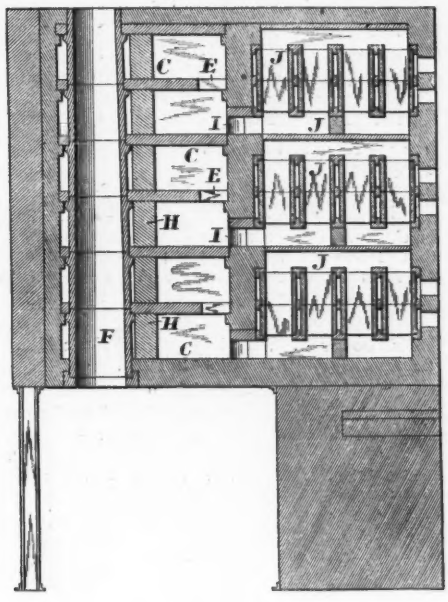


Fig. 2.—Vertical Section on Line 2 of Fig. 3.

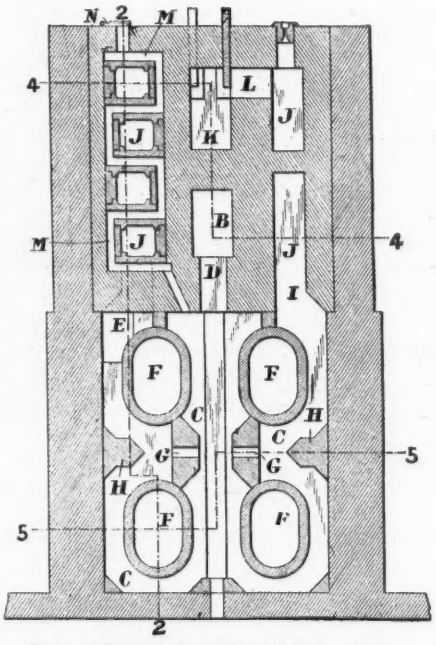
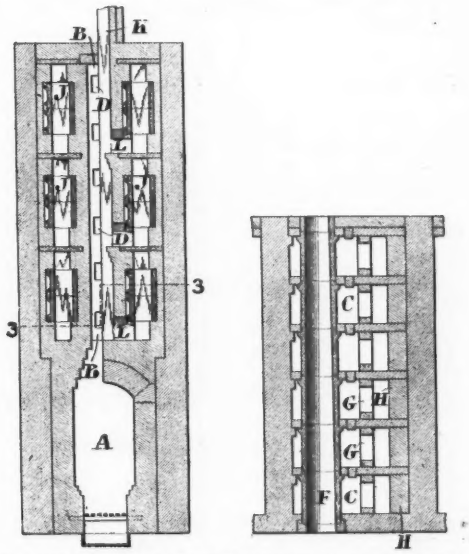


Fig. 3.—Horizontal Section on Line 3 of Fig. 4.



Figs. 4 and 5.—Vertical Cross Sections on Lines 4 and 5 of Fig. 3.

recuperator flues are three in number—one for each set of heating chambers. The gases, after passing through the flues, enter the chimney K through a passage L. Each of these passages is provided with a valve or damper, by means of which the passage of gases to the chimney is regulated—thus indirectly regulating the passage of gases from the flue B to the two corresponding heating chambers. The recuperator flues are provided with stoppers for giving access to them.

In order to supply heated secondary air to the various combustion chambers, each set of recuperator flues J is provided with a pair of sinuous passages M, communicating at one end with one of the combustion chambers and at the other with the atmosphere. The latter passage is controlled by a damper N, so that the supply of secondary air can be regulated to correspond with the amount of gases entering the heating chamber.

In the operation of the bench, the heated gases from the furnace pass into the various heating chambers C. The quantity of gases entering each set of heating chambers, however, can be independently regulated by the valves or chambers provided, as the gases will not enter the combustion chambers unless a corresponding amount of the products of combustion escape through the openings into the chimney K. At the same time a supply of secondary air to each of the combustion chambers can be independently regulated by the dampers N. In this way "perfect control is obtained by the heating of the retorts throughout their entire length, and at the same time the construction is simple and not liable to get out of order."

GLOVER-WEST VERTICALS AT ST. HELENS.

Additional Tests by Dr. Colman.

In the issues of the "JOURNAL" for June 8 and July 20, results were given of tests made by Dr. Harold G. Colman of the Glover-West vertical retorts at St. Helens, when carbonizing washed Orrell nuts and Thornley unscreened coal. We are now able to supplement the figures already published by others relating to further tests carried out by Dr. Colman with Yorkshire Silkstone coal from the Barrow Colliery and Wigan Arley Mine coal.

TEST WITH YORKSHIRE SILKSTONE COAL.

Coal Carbonized.—The total quantity of coal carbonized was 57·05 tons; an average sample, taken from the trucks as unloaded, giving the following figures on analysis:—

Moisture	1·64 per cent.
Ash	5·95 „

Gas Made.—The total quantity of gas produced from the above quantity of coal was 709,400 cubic feet, corrected to 60° Fahr. and 30 in. barometer. Therefore the yield of gas was—

12,435	cubic feet per ton.
237,500	„ per diem.
29,687	„ per retort per diem.
1,484	„ per foot of retort per diem.

Quality of Gas.—Average samples of gas were collected in a holder of about 1000 cubic feet capacity; the period of collecting being mostly from ten to eleven hours. These were tested for illuminating power and calorific power with the following average results:—

Illuminating power	16·19 candles, No. 2 Met. burner
Calorific power (gross)	584·9 B.Th.U.
„ „ (net)	522·0 „

Composition of Gas.—Samples were subjected to the complete analysis, and gave the following average results:—

	Per Cent.
Carbonic acid	1·10
Unsaturated hydrocarbons	2·70
Oxygen	0·20
Carbonic oxide	7·30
Methane	32·30
Hydrogen	53·75
Nitrogen	2·40
	99·75

Production of Coke.—The total yield of coke, weighed moist a short time after discharging, was 43·475 tons, an average sample of which contained—

	Per Cent.
Moisture	12·5
Ash	9·1

The yield of coke is therefore—

15·3 cwt. per ton moist as weighed,
or 13·3 „ „ dry „

Generator Fuel.—The total weight of coke (containing 7 per cent. of moisture) used in the generator during the test was 8·25 tons, or equal to

14·4 per cent. of moist coke.
13·4 „ „ dry coke.

Yield of Tar.—The total production of tar, free from liquor, amounted to 708 gallons, or equal to

12·4 gallons per ton.

Quality of Tar.—The tar was much thinner than that obtained from the same coal in horizontal or inclined retorts, and gave the following figures on analysis:—

Specific gravity, at 60° Fahr., 1·084.

Composition by Distillation, &c.

	Per Cent. by Volume.		Per Cent. by Weight.
Light oils up to 170° C.	8·5	..	6·7
Middle oils, 170° to 270° C.	25·2	..	21·7
Heavy oils, 270° to 350° C.	24·1	..	22·5
Pitch above 350° C.	—		48·5
Naphthalene	—	..	6·9
Free carbon	—	..	3·6

Yield of Ammonia.—The total yield of ammonia, calculated as 10-oz. liquor, amounted to 1364 gallons, or equal to

23·9 gallons of 10 oz. liquor per ton,
20·1 lbs. of sulphate of ammonia per ton.

Yield of Cyanide.—A test of the gas at the inlet to the washer showed the following:—

Cryst. sod. ferrocyanide
($Na_4FeCy_6.10H_2O$) = 4·56 lbs. per 10,000 cubic feet,
= 5·67 lbs. per ton.

Total Sulphur in gas purified with oxide only—
27 grains per 100 cubic feet.

Naphthalene in purified gas—
3·3 grains per 100 cubic feet.

TEST WITH WIGAN ARLEY MINE COAL.

Coal Carbonized.—The total quantity of coal carbonized was 81·82 tons; an average sample, taken from the trucks as unloaded, giving the following figures on analysis:—

Moisture	1·39 per cent.
Ash	3·58 „

Gas Made.—The total quantity of gas produced from the above amount of coal was 993,712 cubic feet, corrected to 60° Fahr. and 30 in. barometer. Therefore the yield of gas was—

12,145	cubic feet per ton.
249,050	„ per diem.
31,131	„ per retort per diem.
1,557	„ per foot of retort per diem.

Quality of Gas.—Average samples of the gas were collected in a holder of about 1000 cubic feet capacity; the period of collection being mostly from ten to eleven hours. These were tested for illuminating power and calorific power, with the following average results:—

Illuminating power	15·22 candles, No. 2 Met. burner
Calorific power (gross)	576·2 B.Th.U.
„ „ (net)	516·3 „

Composition of Gas.—Samples were subjected to complete analysis, and gave the following average results:—

	Per Cent.
Carbonic acid	1·15
Unsaturated hydrocarbons	2·45
Oxygen	0·15
Carbonic oxide	7·30
Methane	33·90
Hydrogen	51·65
Nitrogen	3·25
	99·85

Production of Coke.—The total yield of coke, from a quantity of 41·22 tons of coal, was 32·55 tons, weighed moist a short time after discharging. An average sample contained—

Moisture	12·05 per cent.
Ash	5·87 „

The yield of coke was therefore—

15·8 cwt. per ton moist as weighed,
or 13·9 „ „ dry.

Generator Fuel.—The total weight of coke (containing 7 per cent. of moisture) used in the generator during the test was 10·68 tons, or equal to

13·1 per cent. of moist coke.
12·2 „ „ dry coke.

Yield of Tar.—The total production of tar free from liquor amounted to 883 gallons, or equal to

10·74 gallons per ton.

Quality of Tar.—The tar was comparatively thin, and gave the following figures on analysis:—

Specific gravity, at 60° Fahr., 1·075.

Composition by Distillation, &c.

	Per Cent. by Volume.		Per Cent. by Weight.
Light oils up to 170° C.	7·4	..	5·8
Middle oils, 170° to 270° C.	26·6	..	23·1
Heavy oils, 270° to 350° C.	29·5	..	27·8
Pitch above 350° C.	—	..	42·7
Naphthalene	—	..	6·7
Free carbon	—	..	3·8

Yield of Ammonia.—The total yield of ammonia, calculated as 10-oz. liquor, amounted to 2338 gallons, or equal to

28·6 gallons of 10-oz. liquor per ton,
24·2 lbs. of sulphate of ammonia per ton.

Yield of Cyanide.—A test of the gas at the inlet to the washer gave—

Cryst. sod. ferrocyanide
($Na_4FeCy_6.10H_2O$) = 4·65 lbs. per 10,000 cubic feet,
= 5·64 lbs. per ton.

Total Sulphur in gas purified with oxide only—
30·2 grains per 100 cubic feet.

Naphthalene in purified gas—
3·3 grains per 100 cubic feet.

In the last number of the "JOURNAL," we expressed to M. Payet, who has relinquished the secretaryship of the Société Technique du Gaz en France, our best wishes for his success in the position he will in future occupy in connection with the French "National" Gas-Engine Company. To-day we have to offer him our hearty congratulations on his approaching marriage with Mlle. Irène Gallo, daughter of M. Gallo, Manager of the gas-works at Arles, in which town the ceremony will take place next Saturday.

At the meeting of the Exeter City Council last Wednesday, the Town Clerk reported the receipt of a letter from Mr. F. T. Depree, resigning his seat as a member for St. Leonard's Ward, and enclosing the fine of £5. According to the "Western Morning News," Mr. Depree has taken this step in order to become the Conservative candidate in St. Thomas's Ward (the representative of which is retiring). The works of Messrs. Willey and Co., of which Company Mr. Depree is Chairman, are situated in this ward, and a large number of the employees live in it.

WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.

Half-Yearly Meeting at Tenby.

TENBY, the delightful home of the Incoming President, Mr. A. H. Brookman, which was the place chosen for last week's meeting of the Institution, was, of course, certainly off the "beaten track," and somewhat difficult of access for many of the members. But those who were able to attend were well rewarded for any journey they might have had to undertake, for the gathering proved to be in every way a successful one. After the deluge of Tuesday, which wrought such sad havoc in the valleys of South Wales, Wednesday morning was beautifully fine; and those who were early on the spot found it somewhat difficult to turn their minds to business among such charming surroundings. Towards noon, however, other members began to arrive; and punctually at the appointed hour a move was made to the Assembly Rooms, where the business meeting, extending over a couple of hours, was held. Among the visitors were the President of the Institution of Gas Engineers (Mr. James W. Helps, of Croydon) and Mr. Norton H. Humphrys, of Salisbury; and both these gentlemen, on the invitation of Mr. Brookman, took part in the proceedings, which were also attended by Directors of the Gas Company. It is always a pleasure to see the useful services of a Gas Manager acknowledged; and the kindly references made by Alderman John Leach, J.P. (who acted as spokesman for the Directors), to Mr. Brookman's work, were cordially appreciated by the members. Mr. Brookman has been at Tenby for upwards of thirty years, and has seen the yearly output rise from about 7 million cubic feet to something like 27 millions. The output of gas is at least as great in August as in mid-winter—which is a pleasant state of affairs. But Mr. Brookman enjoys also other advantages. In such a lovely little place as Tenby, the gas-works could hardly fail to be attractively situated. But even so, their position proves to be a surprise for the visitor. Placed in a little hollow, the surrounding trees almost completely hide them from the view of prying eyes; and were it not for the tell-tale gasholder, one would search the landscape in vain for any sight of them. Surely, some of his fellow-managers must have envied Mr. Brookman, when they found their way into his works, and saw themselves standing on the greenest of grass, and with fruit trees and flowers of all kinds within reach of their hands! For a full description of the works, readers may be referred to the interesting paper by the President, which we shall reproduce next week. It will be seen that the Tenby gas undertaking occupies a peculiar position, in that the Company work under a lease from the Corporation, who receive a rent; while the charge for gas is regulated by a sliding-scale, dependent upon the price of coal delivered at the works. A capital luncheon, the hosts at which were the Chairman and Directors of the Gas Company (though the Chairman himself, Mr. H. Travers Smyth, was unfortunately prevented from being present), formed an agreeable portion of the day's proceedings; while Alderman Leach's description of the historical and other associations of the town was also greatly enjoyed. The technical fare, too, was of an interesting character; and altogether it is safe to assume that the members left Tenby with regret, and carried away with them the pleasantest recollections of the meeting and of the warmth of the welcome extended to them.

The Meeting.

The Directors of the Tenby Gas Gompany had kindly provided a room for the business meeting in the Royal Gate House Hotel Assembly Rooms; and here the members gathered at noon last Wednesday. At the opening of the proceedings, the chair was occupied by Mr. THOMAS ACLAND, of Llanelly, the Retiring President, who subsequently gave place to Mr. A. H. BROOKMAN, the new President.

A WELCOME.

Before the business was entered upon,

Mr. C. W. R. STOKES, the Secretary of the Gas Company, introduced his Directors, and said they had pleasure in being present at the meeting. The Chairman (Mr. Henry Travers Smyth), he was sorry to say, was unavoidably absent; but his place would be taken by Alderman John Leach, J.P.

Mr. ACLAND said the members were very glad indeed to have the Directors of the Company with them.

Alderman JOHN LEACH then addressed the meeting, and, after apologizing for the absence of the Chairman of the Company, welcomed the members to Tenby. They were pleased, he said, both as individuals and as a Company, that the Institution had selected Tenby as their place of meeting. He believed it was the first time they had come so far west; but having done so, they had found a very pretty and pleasant little place for the meeting. The Company felt very proud that the members had chosen Mr. Brookman as their President for the coming year. They had known his capabilities for a long time. He had done good service for the Company; and he (the speaker) was sure that this good service he would endeavour to extend to the Institution and other bodies with which he might become connected. They were aware, probably, that Tenby was by no means a new place. In fact, it was a very old town, and had considerable archæological and other associations. [These he proceeded to indicate at some length to the members.] In the year 1835 the first election of a Town Council took place; and improvements were then undertaken, one of which was the establishment of a gas-works. It was an interesting fact that it was only in 1810 that a big London Gas Company was incorporated, and three years afterwards that Westminster Bridge was illuminated by gas; and about twenty years later Tenby was talking about the establishment of a gas-works. It was worth noticing that Tenby, even at that time, possessed a progressive spirit, though it was in want of money. During the period since 1836, under the Corporation's Act, they had spent on water supply, drainage, improvement of roads, laying out of open spaces, and other matters, a sum of from £70,000 to £75,000—not a small amount for a small town, that, at its best, had not a population of more than 4500. He had now only to express the hope that their stay, short as it was, would be a happy one, and that they would take home with them pleasant recollections of the place.

Mr. ACLAND, on behalf of the Institution, thanked Alderman Leach for acting on the part of the Directors, and for the interesting statement he had made of the incidents connected with the ancient and historical town in which they were meeting.

MINUTES OF THE LAST MEETING.

The HON. SECRETARY (Mr. Octavius Thomas, of Pentre) read the minutes of the meeting held last May at Barry; and they were confirmed.

THE LATE MR. THORNTON ANDREWS.

The HON. SECRETARY then read the following letter from Mr. George Andrews, dated June 8, 1909: "I beg to acknowledge the receipt of your letter of the 4th inst., forwarding a copy of the resolution passed by the members of the Wales and Monmouthshire Institution of Gas Engineers at their meeting held on the 19th ult. Will you please convey to the members of the Institution our thanks for the kind vote of condolence with us on the death of our father."

AFFILIATION WITH THE PARENT INSTITUTION.

The HON. SECRETARY read a letter from Mr. W. T. Dunn, the Secretary of the Institution of Gas Engineers, stating that the application for the affiliation of the Wales and Monmouthshire District Institution of Gas Engineers and Managers with the Institution of Gas Engineers had been duly laid before the Council of the latter body, when it was unanimously resolved that it should be acceded to.

APOLOGIES FOR ABSENCE.

The HON. SECRETARY said he had received letters of apology for absence from the Presidents of several of the District Associations. Alderman Thomas Canning had written saying that he regretted very much that he could not, after trying hard, see his way clear to get to Tenby for the meeting. After a very arduous season's work, he was taking a short rest, and could not much prolong it; and so reluctantly he had to forego the Tenby meeting, to which he had looked forward with much interest.

DEATH OF MR. DAVID JONES.

Mr. ACLAND said he had now a rather sad duty to perform; and that was to propose a vote of condolence with Mrs. David Jones and family in the loss they had sustained by the death of Mr. Jones, who was a member of the Council of the Institution, and Manager of the Dowlais Gas-Works.

The HON. SECRETARY seconded the vote, which was passed by the members rising silently in their places.

NEW MEMBERS.

On the proposition of the HON. SECRETARY, seconded by Mr. R. A. BROWNING (Neath), the following new members were unanimously elected: Mr. James Black, Gas Manager, Sharpness Docks; Mr. Robert John Calderwood, Gas and Water Manager, Milford Haven; Mr. J. Gibbon, Gas Manager, Haverfordwest; and Mr. William Valon Watson, Gas Manager, Ebbw Vale.

The New President.

Mr. Acland said he now had the pleasant duty of introducing the President Elect, Mr. A. H. Brookman—pleasant it really was, because he knew that in his hands the affairs of the Institution would be in good and safe keeping. He was sure that Mr. Brookman, assisted by their able Hon. Secretary, would uphold the dignity and credit of the Institution; and he hoped his year of office would be as happy as his own had been.

Mr. Brookman then took the chair, amid applause. He said he felt that, though the Institution had not been a long time in existence, he had to follow men who had distinguished themselves in the profession. He had an arduous task to perform to in any way arrive at their standard; but he hoped, with the assistance of the members and of the Hon. Secretary, to satisfactorily discharge the duties of the position and help on the work of the Institution. He thanked them all for the honour done him.

Thanks to the Retiring President.

The President said his first duty was to propose a vote of thanks to Mr. Acland, the Retiring President. Those who knew Mr. Acland were aware that anything he undertook would be well done; and the members of the Institution had had ample evidence of his ability. He had conducted the meetings in an excellent manner, and ably carried out all the work. He therefore had great pleasure in proposing a hearty vote of thanks to him.

Mr. Browning seconded the proposition, which was cordially agreed to; and Mr. Acland briefly returned thanks.

The President then delivered the following

INAUGURAL ADDRESS.

Gentlemen,—My first duty is to thank you for the honour you have conferred upon me by electing me President for the ensuing year, and for the additional compliment you have bestowed upon me in selecting Tenby as the place of your fifth annual meeting. I can assure you this is as much appreciated by my Board of Directors as by myself.

Before proceeding to refer to gas matters in general, I should like to say a word or two about the Wales and Monmouthshire Institution, and to congratulate you on the progress it has made, and on the prosperous position it has attained in so short a time. It is just four years this month since we held our first meeting, under the presidency of Mr. Thomas Canning; and when we look back over those four years, and review the useful work accomplished, I think you will agree with me that we have much reason to be gratified with the success that has attended the establishment of this the youngest District Association of Gas Engineers. We recognize that our heartiest thanks are due to those gentlemen who initiated the idea and brought it to fruition.

Two meetings have been held each year, for business and the discussion of papers; and the following towns have been visited: Cardiff, Newport, Swansea, Neath, Shrewsbury, Llanelly, and now Tenby. Papers have been read on a variety of subjects, all of which have been the means of imparting useful and valuable information to the members. Indeed, in this respect, I am of the opinion that District Associations, owing to the peculiar position they occupy, serve a more useful purpose than the parent Institution. I have noticed, from my own observation, that at meetings of the smaller bodies, members are more inclined to express their thoughts and opinions freely than they do in the larger assembly, composed, as it usually is, of experts on gas matters, gathered together from all parts of the world. I think the chief aim of a District Association should be to afford opportunity to its members to meet for free discussion and interchange of views on current topics connected with the gas industry. Instead of following the beaten track of listening only to prepared papers, I would suggest that we should encourage informal discussions similar to that on the question of the calorific power standard which was so ably introduced by our ex-President (Mr. Acland) at the Barry meeting in May last. We might also invite gentlemen who are not members of the Association to attend the meetings and add to our stock of information, by speaking on questions which directly affect the gas industry. In some districts, Commercial Sections and Investigation Committees have been formed; and the advisability of following this example is a point worthy of consideration on our part.

Another point in favour of the District Associations is that they can hold their meetings in towns, such as Tenby, which are not likely to be visited by the Institution of Gas Engineers. Thus the smaller undertakings are brought into touch with the leaders of our profession, and derive advantages similar to those enjoyed by larger towns. In remote districts visits from brother managers are extremely rare; and the result is that we are perhaps liable to get a little rusty and antiquated in our views of things. It should, therefore, be of immense advantage to managers of such works as I speak of to have a District Association to visit them; for the more opportunities we have of meeting together in friendly conference, and of assisting each other to solve the many knotty problems that confront us, the better it will be for the gas industry in general, and for the works we have under our control in particular. We may at times get a rude awakening from some of our cherished and crusted notions; but we shall be all the better for the shaking up.

In passing, I may refer to the decision of this Association to affiliate with the Institution of Gas Engineers, which was reached at our last meeting. This is a step which should add to the usefulness and the influence of our Association. We have now the power of nominating a representative on the Council of the Institution; and those members who have not yet joined the Institution have the privilege of doing so without payment of the entrance fee—an advantage of which I hope they will very largely avail themselves.

I take this opportunity to congratulate the Livesey Memorial Committee on the success of their efforts. They have been able to establish a Chair for Fuel and Gas Engineering at Leeds University. It is a worthy commemoration of one who was, in the broadest sense of the word, a benefactor to his race. I take it that those who teach or give to others the means of improving themselves, work on a higher platform, and do more lasting good, than those who merely administer charity. It is a good and glorious thing to relieve suffering, and I would be the last to disparage charitable effort; but is it not better to destroy the root of the evil than to administer a palliative? The man has gone, but his work remains. We were glad to join with other District Associations in supporting such a deserving movement, and that not only from the commemorative aspect, but also because of the crying need in our profession for the best obtainable scientific and chemical training. Many have essayed in the past to enter upon this department, but have found it a difficult and a toilsome matter. The present effort will tend to smooth the way.

I am sorry that the first scholar has not entered the gas profession. But he is not altogether lost to us; on the contrary, he is now in a position to do useful work for the industry. Yet why did not one of our leading gas undertakings secure the honour of employing the first Leeds scholar? And here I venture to tread on somewhat delicate ground. There is room for more practical appreciation of the trained scientist. Young men are being continually urged, in season and out of season, to educate and improve themselves. Yet there are widespread complaints among medal winners, holders of scholarships, and other distinctions, as to the difficulty of getting employment. When we read advertisements like this: "Wanted, for a gas-works laboratory, thoroughly qualified man, salary 30s. a week," we wonder whether the time and money spent on technical training are considered to have had a practical end in view. Is it undertaken for amusement or for business purposes? Is the student to practically give away the results of his labours for the direct benefit of one gas undertaking and the indirect benefit of all? Is he expected to take up scientific work as a pleasant recreation for leisure hours? Or is he to regard it as a means of earning a respectable living? Of necessity, it means the last-named to ninety-nine out of a hundred. Until a reasonable financial inducement is much more in evidence than it is at present, the best abilities will not be attracted to the gas industry. Parents and guardians do not fail to appreciate the signs of the times, and the promising young scientist will be advised to direct his attention elsewhere.

The Council of the Institution of Gas Engineers, having drawn attention to the proposed "Regulations for Financial Organization and Administration" suggested by the Institute of Municipal Treasurers and Accountants, it will be of interest to those members working under local authorities to consider the matter. The recommendations proposed are as follows:

That it should be made compulsory for every local authority of sufficient size to appoint a Finance Committee, with general powers of control and supervision of all matters of finance.

The term "Financial Officer" is defined as meaning "the treasurer, accountant, or comptroller acting as the chief financial officer of the Council."

Separate annual estimates of capital and revenue accounts shall be submitted to the Finance Committee of the Council in such form, and under separate headings, as the Finance Committee prescribe. The preparation of the estimates shall be by the various heads of departments, in consultation with the financial officer.

"He" (presumably the financial officer) shall present the draft estimates to the various Committees for approval, and at the same time furnish the Finance Committee with a copy thereof.

The financial officer shall bring up to the Finance Committee the annual estimates approved by the various Committees.

In considering the capital estimates, the Finance Committee shall have regard to the maximum amount which, in their opinion, the Council should seek to borrow in the year.

No liability exceeding £50 shall be incurred (by any Committee) without the express sanction of the Council, except in the case of Committees acting in pursuance of statutory or specially delegated powers of expenditure.

It shall not be in order to submit estimates to the Council through any Committee other than the Finance Committee, except in cases of urgency, or where the Council is under statutory obligation to proceed.

No recommendation or proposal involving expenditure on capital account shall be submitted by the Finance Committee to the Council.

The heads of departments shall submit to the financial officer the contractors' detailed accounts and measure bill, for his examination and comparison with the contract, specifications, and bills of quantities, also a statement showing the additions and deductions on the contract (if any); and the final certificate of the heads of departments is not to be issued until this has been done.

The heads of departments shall furnish the financial officer with particulars of all estimates and tenders.

In connection with this matter, a Departmental Committee was appointed in 1906, by the President of the Local Government Board, to inquire into, and report upon:

1—The system on which the accounts of local authorities in England and Wales are at present kept.

2—Generally as to the system, and in particular whether such accounts should be prepared on a system requiring the entries of receipts of money or not.

3—The regulations which should be made on the subject.

Their report was issued in July, 1907. Twenty-eight witnesses were called before the Committee, of whom six were district auditors and fourteen were nominated by various associations. The Institute of Municipal Treasurers and Accountants were represented; but the Institution of Gas Engineers or any of the other professional institutions were not. The system of accounts recommended is what is termed the "Income and Expenditure System," which is the one already in use in connection with nearly all trading concerns belonging to local authorities, instead of the "Receipts and Payments" system, usually adopted in connection with the collection of rates. The Committee also recommend the appointment of an officer to control the accounts, independently of the official in charge of trading or other departments. You see, then, that the Institute of Municipal Treasurers and Accountants have taken advantage of the report, and are trying to push the matter forward. It is interesting to note that the system recommended, with the exception of small additional details, is precisely what the managers of the various gas undertakings are already using, though no credit is given them for it. As it is important that every chief officer of a department should retain his authority, it behoves all to do their utmost to oppose the movement suggested by the Institute of Municipal Treasurers and Accountants.

With regard to technical matters, I think that we are extremely fortunate in having many high-class journals to represent the gas industry. Every week their pages are full of well-written articles, scientific and technical. In fact, no subject or question relating to gas matters seems to escape their attention; and I have no hesitation in saying that the forward movement and new spirit of energy which have characterized the gas industry of late years is largely due to the stimulating encouragement of the Technical Press, of which, no doubt, you are all diligent readers. I therefore feel that it would only be a waste of time if I attempted to make a long address on technical matters. There are, however, some aspects of the present position of the industry that I would like to touch upon. The majority of the members of this Association are (like myself) managers of small or medium-sized works. My remarks, therefore, must be understood to apply more particularly to those who occupy such a position than to managers of large undertakings. You are well aware that the multifarious duties and the daily routine work attached to the position of a gas manager are sufficient to keep him fully occupied; leaving him little time to wander through the attractive fields of experiment and research.

I have been connected with the gas industry long enough to have seen many changes brought about, and new conditions arise, both in the manufacture and the supply of gas; and while some of these have relieved the manager of many worries and anxieties, others have added greatly to his responsibilities. There was a time when a gas-works could shut down for a day or so in the summer months for the purpose of effecting alteration or repairs. Now it is difficult to do so even for a few hours; for directly the requirements of the lighting season begin to slacken off, the demand for cooking and other purposes increases. In fact, the tendency towards an equal load, day and night, summer and winter, is rapidly growing, and affords evidence of the extended use of gas for industrial and domestic purposes. To cope with these new conditions, our works need to be equipped with the very best plant, which should always be kept up to the highest standard of efficiency—indeed, it is absolutely necessary to duplicate many parts of our works as a safeguard against unforeseen contingencies. Another feature of this changed condition of things is that we cannot follow Mr. Newbigging's advice and keep down the pressure in the mains. On the contrary, it is necessary to keep up a uniform pressure day and night. From this, and with the increasing use of the steam-roller and the growth of heavy traffic on the roads and streets, it follows that the problem of reducing the leakage account to reasonable limits is rendered more and more difficult.

Another difficulty with us at Tenby—and I daresay many of you have met with the same experience—is the disposal of coke. The production of coke at a time of the year when there is very little demand for it is forced upon us by this growing consumption of gas. A remedy would, of course, be found in the adoption of one or other of the carburetted water-gas plants; and this is a step we are seriously contemplating at Tenby.

Perhaps of the many problems confronting the gas manager at the present day, none is more perplexing than that of deciding upon the particular type of plant or machinery that will be most suitable for the works under his charge, and is likely to prove the best investment in the long run. There is a growing tendency to adopt labour-saving appliances for every purpose for which it is thought they can be profitably employed. But while the manager does well to take advantage of the numerous inventions available for reducing the cost of gas production and displacing the heavy manual work of the retort-house, he requires to exercise great care and caution before committing his proprietors to capital expenditure which may take years of saving to overtake. Machinery, looked at from one point of view, may appear economical; but when interest on outlay is considered, and proper allowance made for depreciation, the case may wear a different complexion.

An illustration of this may be found in the rapid evolution of methods of carbonization. A short time ago the struggle lay between horizontal and inclined retorts, but to-day it is the continuously fed vertical retort that holds the field. This is a modern adaptation of an old idea which has been the subject of much experiment by gas engineers. It may interest you to learn that one of the earliest types of a continuously fed vertical retort was experimented with at Tenby as far back as the early seventies of the last century, by the late Mr. George Wilson Stevenson, who was then lessee of the works. This differed somewhat from the latest type, inasmuch as it was fitted with a central shaft with short lengths of worm or screws, keyed on at intervals of every 6 inches of its length. The idea was to work the coal down by means of the worm, and so obtain continuous feed and discharge. The shaft was the chief cause of failure, as no iron could be found capable of standing the intense heat of the interior of a retort. Whether the modern adaptation of the system is the last word in retort construction, it is impossible to say. He would be a rash man who ventured to say what the next step will be. My own impression is that future developments in the manufacture of illuminating gas must be looked for in another direction. If we glance over the pages of the "Power Gas" number of "Cassier's Magazine," and note the wonderful progress and great strides that have been made in the construction of producer and suction-gas plant within the last few years, it will occur to us that future progress must be on similar lines, as, after all, our chief business is to make gas.

From the consideration of the manufacture of gas, our thoughts naturally turn to distribution. Here, also, we find the same extraordinary progress and changed conditions. Some of us can, I daresay, recall the time when the use of gas was practically confined to lighting; and the principal means of using it for this purpose were batswing and fishtail burners. The past fifty years has been marked by great advances in all the industries of the world; and that which concerns us most (the gas industry), we have seen developing at a remarkable rate and holding its own against all competitors. Although gas no longer holds the monopoly of artificial lighting, the improvement in the means of using it for other purposes has placed it in a much stronger position than it ever held before, and, by means of the great invention of Dr. Auer von Welsbach, it has beaten all competitors in the beauty and cheapness of its light.

When the President resumed his seat,

Mr. ACLAND remarked that a time-honoured custom prevented them from criticizing the Presidential Address. Mr. Brookman had dealt with matters in an able and instructive manner; and he proposed a vote of thanks to him.

This was seconded by Mr. BROWNING, and met with a hearty response at the hands of the members.

The PRESIDENT briefly acknowledged the compliment.

SOME POINTS OF GAS-WORKS ECONOMY.

The PRESIDENT said that, in the absence of Mr. J. H. Canning (Newport), who was down on the *agenda* to open a discussion on "Some Points of Gas-Works Economy," he would ask the Hon. Secretary to read the notes he had prepared and forwarded.

The HON. SECRETARY said Mr. Canning, in a letter, stated that he had delayed writing until the last moment, hoping that there might be some possibility of him attending the meeting; but he regretted to find it was absolutely out of the question. They were carrying out considerable alterations, including an installation of a Fiddes-Aldridge stoking machine, at the Crindau works; and in consequence his father and he had been obliged to postpone their holidays. His father had just gone away; and so it was quite impossible for him to be absent too.

The notes were then read by the Secretary; and they will be found, together with a report of the discussion to which they gave rise, on p. 47 of this issue.

THE WORK OF THE INSTITUTION OF GAS ENGINEERS.

The PRESIDENT then introduced to the members the President of the Institution of Gas Engineers (Mr. J. W. Helps, of Croydon). They offered Mr. Helps, he said, a most hearty welcome, and congratulated him on the honour of the great position which he held. He hoped Mr. Helps would make some remarks.

Mr. J. W. HELPS (Croydon) thanked the President very much for his welcome, and for giving him the opportunity of making a few remarks. He said he wanted first of all, before referring to Mr. Canning's notes on "Some Points of Gas-Works Economy," just to allude to one or two matters in connection with the Institution of Gas Engineers and the District Associations. He had very great pleasure in being present at this meeting for two reasons. The first was a personal reason, and the second an official one. With regard to the personal reason, he could lay claim, he thought, to having known their President longer than anyone else had done who was connected with the Association. Mr. Brookman and he (Mr. Helps) were together at the Bath Gas-Works more years ago than he liked to think of; and he felt he could safely say that the first rudiments of work in connection with the distribution department he learnt at the same time that Mr. Brookman learnt his work. He had to thank Mr. Brookman for a good many hints, as a somewhat younger man, in connection with what he did there. To come to his second reason, he wanted to thank the Association, as President of the Institution of Gas Engineers, for their invitation, and to tell them how much he appreciated the honour of that invitation. In the course

of his address, the President had remarked that, owing to the peculiar position they occupied, he was of opinion that the District Associations served a more useful purpose than the parent Institution in the imparting of useful and valuable information to the members. There was a great deal in this; and he thought it was on the principle, which they all knew to be a true one, that committees really did the main work in all associations. They could not in the parent Institution be cognizant of all the conditions which existed in every district throughout the country; and he thought that the good of the amalgamated Societies, as they now had them, arose from the fact that they were able in London to "bottle up" and get in a concentrated form the requirements and needs of the gas managers spread all over the country. In this way, they were in a better position to deal with them than they would have been without affiliation. He congratulated the Wales Association on having affiliated with the parent Institution. It was going to have mutual advantages. The parent Institution were going to derive good from learning the views that would thus be put before them; and he felt sure the Wales Association themselves would benefit from being able to send up to the Institution their own ideas and their own needs through the accredited representative who would sit at the Council meetings from time to time. It seemed to him that in their great industry—the gas industry—the truth of the good old saying "Unity is strength," was very strongly shown. They had proved by these amalgamations that they had unity on the professional side; but he thought this unity wanted to be carried a little farther. It was no good to expect that the amount of work that ought to be done could be accomplished with the finances that were at their disposal. These were derived simply from the subscriptions of 800 or 900 members, which formed the revenue of the year. They ought to be able to look with confidence for a little more assistance from directors and shareholders of gas companies. It was rather hard to say so at this meeting, because he was now speaking in the presence of some directors who had shown their interest in the Wales Association and its work by attending during the transaction of the technical business, and by the way in which they had backed up Mr. Brookman's efforts in connection with the organization. But he did feel that they had a right to expect from directors and shareholders a little bit more assistance from a financial point of view. He had, he believed, the reputation of being one of the most arrant beggars in the gas industry. He had done a great deal in the way of sending out circulars, &c., asking for help; and in reply he was often asked the question—in connection, for instance, with a gas exhibition to be held in London—"What is the good to us of an exhibition in London? If it were to be in our own district, we should be pleased to support you." This, however, was a very narrow-minded method of looking at things. Anything that was done for the good of the industry in any part of the country, must eventually be reflected in one's own particular district. He hoped these few remarks in regard to the matter would filter through to other directors, and that they would see it was their duty to provide the Institution with the means to carry on the research and different work which they had not so far been able to undertake. This was a matter that received great attention on the Continent; and it was due to this fact that certain countries had gone so much ahead. It was not a very long time ago that one would have been struck by the backwardness of both France and Germany—and especially of the former; but now they were well up with this country, and it was from them that, of late years, Englishmen had obtained many notions and much knowledge, which had enabled them to bring about improvements in their own works. He did want to impress upon those present that it was of the utmost importance that they should do all they possibly could to educate their directors up to the advisability of replying a little more favourably when the question of helping the Institution with funds came before them. The President had referred to the Chair of Gas Engineering at the Leeds University. Now, he (Mr. Helps) had had the pleasure of going over the University, and talking with those responsible for what was being done; and he thought he could assure the members that a very great work had been started there, and one which would not only have a highly beneficial effect on the industry from the point of view of the education of young men, but would, by the researches carried out, put an end to many difficulties and set at rest many doubts the solving of which would be of great assistance to them in the conduct of their work. He appreciated the honour of the invitation that had been extended to him, and thanked the members very heartily indeed, on behalf of the Institution of Gas Engineers and himself, for their kindly welcome, and also the Directors of the Tenby Gas Company for their appreciation of the meeting and the hospitality they were shortly going to extend to those present. Mr. Helps then made some remarks on the subject of Mr. Canning's notes; and these will be found reported elsewhere, along with the remainder of the discussion.

The PRESIDENT said he must thank Mr. Helps for his remarks and the old associations he revived in connection with, he was going to say, their boyhood. Certainly, it was going back almost more years than one cared to remember; but those were happy days, so far as he was concerned. It was very good of Mr. Helps to undertake so long a journey in order to attend the meeting.

The Tenby Gas-Works.

The PRESIDENT had prepared, and distributed copies of, a paper on the Tenby Gas-Works; but owing to pressure of time, it was agreed that this should be taken as read. The description will appear next week. It is crowded out of the present issue of the "JOURNAL."

Votes of Thanks to Authors.

Mr. BROWNING, in proposing a vote of thanks to Mr. Canning and the President for their contributions, expressed regret at Mr. Canning's absence. They were, he said, always pleased to have his notes and papers, because they were so practical.

Mr. A. W. BRANSON (Caerphilly), in seconding, remarked that a good deal of Mr. Canning's paper was perhaps above the heads of those among them who were connected with small works; but the references to the retort-house they could all take to heart.

The PRESIDENT acknowledged the vote.

Appointment of a Representative on the Council of the Institution of Gas Engineers.

The HON. SECRETARY said the first member to be selected to represent the Wales and Monmouthshire Institution on the Council of the Institution of Gas Engineers was their first President, Alderman Thomas Canning. Their next President was Mr. R. A. Browning; and he had pleasure in proposing that this gentleman be now elected as their representative.

Mr. ACLAND seconded this, and it was unanimously agreed to.

Place of Next Meeting.

The PRESIDENT said that several places had been suggested for the next meeting; and he proposed that the Council should be left to deal with the matter.

This was agreed to.

Tenby Gas Company Thanked.

Mr. ACLAND proposed, and the HON. SECRETARY seconded, a hearty vote of thanks to the Chairman and Directors of the Tenby Gas Company for their kindness in providing a room for the meeting, and for the hospitality of which they were about to partake.

The members signified their agreement with this by a round of applause.

The Luncheon.

After having been photographed in a group, the party proceeded to the Royal Gate House Hotel, where they were entertained at luncheon by the Chairman and Directors of the Tenby Gas Company. Over thirty sat down to a most enjoyable repast, at the conclusion of which a short toast-list was gone through. Alderman Leach presided.

Alderman LEACH, after the "Loyal Toast" had been duly honoured, proposed "Success to the Wales and Monmouthshire District Institution of Gas Engineers and Managers." He said they lived in an age of combination. The order of the day seemed to be "Combine;" and he quite appreciated the efforts made to this end on behalf of the Institution, because he believed they must result in good both to the members and to their undertakings.

The PRESIDENT, in responding, thanked Alderman Leach and his brother Directors on behalf of the Institution for their hospitality and the reception they had given the members. The Institution, like others of its kind, existed for the purpose of enabling the members to help each other over difficulties; and in this way they benefited the undertakings they had charge of. It would be impossible to over-estimate the value of these meetings to the gas industry; and he thought he was quite justified in saying that, where advantage had been taken of the hints and suggestions thrown out at the meetings for improving the works and securing economies, it had been the means of adding largely to the profits of the undertakings. Therefore it was gratifying to him to find that his Directors, and other Directors, were learning more and more to appreciate the good that was being done by gatherings of this kind. They thus recognized the value of the work performed; and managers were encouraged to improve the industry, and to strive to bring about further progress.

Mr. ACLAND proposed "The Tenby Gas Consumers' Company," also remarking that it was not only gratifying but very encouraging that they, as members of the Institution, should find that the Directors of the respective gas-works took an interest in the meetings, and assisted them in the kind manner that the Tenby Directors had done on the present occasion. He ventured to hope it would not be the last time they would visit Tenby.

Mr. WILLIAM LEWIS, a Director, returned thanks, and said it had given them great pleasure to entertain the members of the Institution, as they believed such meetings were the means of doing a great deal to advance the interests of the gas industry. They could truly say that since the formation of the Company the aim of the Directors had been to supply the public with a good article at a reasonable cost; and to do this, they had spared no effort to improve the works and to obtain the best results. It was only fair he should acknowledge that a great deal of the success of the Company's operations had been due to their excellent Manager, who, he was pleased to see, had been elected President of the Institution.

The PRESIDENT, in proposing "The Mayor and Corporation of Tenby," said that Alderman Farley, the Mayor, took a great interest in the affairs of the town; and his presence there that day indicated, he thought, the pleasant business relations that always existed between the Corporation and the Gas Company. The interests of the two bodies were identical. They were both specially and peculiarly concerned in the supply of gas—a commodity upon which the welfare and prosperity of a town like Tenby largely depended; and he was glad to see this recognized both by the Company and the Corporation. The result was there was none of that friction between the parties which was generally detrimental to the community and bad for everyone all round

The MAYOR, in reply, remarked that he had been a member of the

Corporation for quite twenty years; and during this period the relations between the Company and the Corporation had always been pleasant. Some nine or ten years ago, perhaps, things were rather strained. A new Company was almost formed; but they found they could not go on with it. The Company had a great deal for which to thank their Manager. Mr. Brookman had plenty of grit.

Mr. D. Rees Edmunds, Solicitor, Llanelly, on being called upon, said it had afforded him much pleasure to be present, and especially to listen to Mr. Helps's speech, although he must not forget that Mr. Humphrys came in a good second, nor must he omit what the President himself said. He was not connected with any gas undertaking, except as a small shareholder; but he had been concerned, in a way that he thought was not altogether unknown in some parts of the country, within the last two or three years, in bringing about the end of that "bucket-shop" gang who had been a disgrace to the gas-making world, during the last three or four years in particular. He was sure they would forgive him the little conceit he was guilty of in saying this. They had heard that a name had been painted off from a door of a particular office in the City of London. Well, perhaps he (the speaker) was responsible more than anyone else for bringing about this state of things; and he was sure the gas profession and *bonâ fide* investors in the gas undertakings of this country generally would be the better and healthier for it. He ought to say that both the "Journal of Gas Lighting" and "Gas World" had rendered excellent and unselfish service in bringing the matter about.

Mr. Helps proposed "The Health of the Chairman," who he said was connected with the Gas Company, and was also a prominent member of the Corporation. He hoped that the relations between the two bodies would be as pleasant in the future as in the past. So long as corporations avoided association to any extent with municipal trading, there was no difficulty whatever in maintaining pleasant relations between them and companies; but it seemed to him that when they got hold of undertakings and ran them contrary to the interests of local trade in the town, friction must at times arise. He had experienced this himself. That such an occurrence had not taken place in Tenby, he thought the ratepayers had much to thank themselves for.

Alderman Leach, in response, said that if the Chairman of the Company had been able to be present, it would have afforded him as much pleasure to preside as it had himself. A good deal of the success of the Company had been due to the Secretary, Mr. C. W. R. Stokes, a gentleman who, like himself, had been connected with the Corporation for a great number of years. He became Town Clerk; and he was in the forefront of every good thing that took place in Tenby. He proposed "The Health of the Secretary."

Mr. Stokes, in acknowledgment, said he had been connected with the Company since 1876; and from that time to this, his office had always been a most pleasant one. The Directors had always seen eye to eye with the Manager and himself. With Mr. Brookman, they had never had a sign of friction. Mr. Brookman's ambition and his had been first to serve the Company and secondly the consumers. They argued that if they supplied a good article, the consumer would come and take it; and they did everything they could to encourage the people to use gas. The shareholders' interest was the interest of the Company; and they—the Secretary, the Manager, and the Directors—always considered what was best for the benefit of the shareholders, because they had invested their money in the concern and expected to receive good interest. The Company had generally paid 7½ per cent.; and now it was 10 per cent.—a very creditable dividend, which they hoped to continue for years to come. The Corporation had a little difficulty with regard to the renewal of the lease in 1896; but wiser counsels prevailed, and they fell in with the idea that the old Company was the Company for Tenby. He hoped it would continue to be the Company for Tenby as long as he lived.

On rising, the members separated themselves into groups, to visit the gas-works and see as much of the attractions of the town as was possible in the time at their disposal.

SOME POINTS OF GAS-WORKS ECONOMY.

[A Discussion at the Meeting of the Wales and Monmouthshire Institution. Sept. 29.]

Mr. J. H. Canning (Newport) forwarded the following notes to open a discussion on this subject. These were, in Mr. Canning's absence, read by the Hon. Secretary (Mr. Octavius Thomas).

I fear that in accepting the invitation of the President and Council to open this discussion, I have been actuated more by the certainty of myself acquiring valuable information than by the hope of being able to lay before you anything novel upon so well-worn a subject.

In the first place, it may be advisable to refer briefly to a difficulty which faces us at the very outset, and which, though a matter of common every-day experience to all of us assembled here, is not, however, always fully realized by those possessing a less intimate, practical experience of the daily working of a gas undertaking. This difficulty may be briefly expressed in the statement that it is impossible to lay down a general scheme of effecting economies which shall be beneficially applicable to any and every gas-works. There can nowhere be found a more striking illustration of the proverbial fact that "one man's meat is another man's poison;" for that which constitutes a most laudable and striking economy in one works, would be absolutely prejudicial and ruinous if introduced elsewhere. Speaking generally, economies may be compared with those forms of vegetation which do not usually survive transplantation, but must be sown in the spot where they are to grow. Gas-works throughout the country are mutually indebted to each other for innumerable general ideas of methods whereby saving may be effected; but in almost every case, owing to the varying conditions of site, cost of materials, market for residuals, and a host of other considerations, the original idea must be modified—sometimes beyond recognition. It is therefore necessary to qualify any remarks upon this most important subject by stating beforehand that it is tacitly understood that any economy referred to is justified by the prevailing conditions.

Economy in capital expenditure, though so important—its presence or absence leaving indelible traces perennially upon the balance-sheet—hardly falls within the scope of to-day's discussion, which is rather confined to working economies, the most striking and most effective of which must from the nature of things be effected in and about the retort-house. This is manifest from the fact that carbonization is, to all intents and purposes, a final and decisive operation. The distillation of the coal once effected, then, whether for good or for ill, the quantity, quality, and composition of the coal gas and the accompanying residuals are practically unalterable. Good carbonizing may be roughly described as the provision of the adequate heat and the moving of the coal and its products respectively into and out of its influence, with the most satisfactory financial results possible under the local conditions. Hence the economies possible divide themselves roughly into those relating (*a*) to the heating of the retort-settings, and (*b*) to the mechanical handling of the coal and coke.

At the present time, little that is new can be said as to the working of regenerative furnaces. They are now of practically universal adoption; and their fuel consumption, as well as the uniformity and regularity of the heat furnished by them, leaves in almost every instance little to be desired. It is usual to regulate their working in accordance with the indications yielded by one of the various types of gas analysis apparatus now on the market; and in this connection it must be remembered that, useful as these appliances are, totally erroneous conclusions may be drawn from their indications if they be employed either shortly before or after firing-up or cleaning the fire. In other respects, the chief points requiring attention are the maintenance of a good depth of fuel, rapid firing-up with hot, clean coke, and the keeping clean of the fires and waste-gas flues. As to the actual process of carbonization, the immense developments now taking place in this department of gas manufacture place us all in the position of earnest and observant students. In general, however, it would appear that what may be termed "balance" is being sought, and to some extent attained, in this matter. In other words, such a relative proportion is being observed between the heat of the retort and the weight of charge as, not merely to secure the highest possible make per ton, but to secure that maximum make per ton concomitantly with high calorific value and good yield of residuals, while all such difficulties as stopped pipes and the innumerable troubles attendant on carbonization shall be at a minimum.

In approaching the mechanical handling of coal and coke (in which term mechanical and gravity types of stoking are included), one is immediately struck, both by the immense variety of systems in vogue and also by the considerable amount of success attained by each in its proper sphere. On comparing, for instance, the almost endless procession of coolies, each carrying a few pounds of coal, unloading a cargo for a gas-works in the Far East, with the modern labour-saving equipment of one of the Metropolitan or large Provincial works, one is struck by the apparently immense contrast of method; and yet each undertaking successfully makes use of the most economical means available under its own special conditions—which is, after all, the entire spirit and object of true engineering.

Two points may here be profitably dealt with; and the first is the employment of electricity in gas-works. One of the chief obstacles hitherto to the application of this agent to the purposes of our industry has been a more or less sentimental aversion to the employment of a commercial competitor. This objection would carry more weight were the required energy purchased from a rival concern. But when, as is almost universally the case, gas undertakings generate their own current by means of gas-engines far more cheaply than it can be purchased, it is evident that the grievance (if any) should be felt by the local electrical undertaking. After all, the power is really derived from the gas; electricity forming no more than a convenient intermediary for its distribution, and playing merely the part of the air or water in a compressed air or hydraulic installation respectively.

The use of electricity as an agent for power distribution certainly conduces to economical working in so far as it enables the whole of the power generating plant to be centralized. It must, however, be used with judgment and a certain amount of knowledge; while, if it is to be successful, all motors and their adjuncts must be of full power for the work they are to carry out, as an electric motor does not possess that elasticity and staying power which enable a gas-engine to carry an overload for long periods with ease and security. Were it possible to drive the whole of a gas-works plant direct from one motor, then the gas-engine would be at once the most economical and efficient source of power; but when, as is the actual case, power is required at numerous points, electricity really furnishes a convenient intermediary. The whole of the coal and coke handling plant in use at the Crindau works of the Newport (Mon.) Gas Company is electrically driven, and includes capstans and movable truck tipping-crane on the sidings, coal-breakers, elevator, and push-plate conveyor delivering coal into continuous overhead hoppers, whence, by means of the Aldridge-Gibson patent doors, the coal is automatically supplied to a Fiddes-Aldridge stoking machine, the coke discharged by which is handled by means of an electric telpher.

The telpher is one of those types of plant now coming into use upon gas-works which may be more readily and efficiently driven electrically than by any other means at present available; and the use and capabilities of this machine are the subject of the second point referred to above. One of these plants has now been in use at Newport for three years. Under the conditions existing at these works, a telpher fulfils all requirements most satisfactorily and economically; for it not only removes, extinguishes, and stacks the hot coke, but also loads coke into waggons on the high-level siding and unloads bricks, fire-clay goods, castings, and the numerous and varied materials delivered to a gas-works by rail. But the real and substantial benefit of the telpher is that it handles its load without injury either to the coke or to the plant. The coke can exercise no cutting or grinding action upon the apparatus; and being tipped from the waggons at the least possible elevation, breeze is reduced to a minimum.

The question of breeze also leads one to consider the methods of disposing of the quantity, whether large or small, which will inevitably be produced, even under the most favourable conditions. This material realizes a most inadequate price in the market; and large quantities of it may be profitably consumed in one of the many types of boiler-furnaces suited for burning it. We have at Newport also used with considerable advantage the larger breeze, freed from dust, mixed with coke in a water-gas generator. Either method releases large quantities of valuable coke for sale.

Another minor economy incidental to carbonization may be mentioned. At Newport, the whole of the water used for coke extinguishing, together with the rain water from the retort-house and yard, is caught, allowed to settle, and pumped back to a high-level tank by means of a centrifugal pump electrically driven, and fitted with a float-switch which renders it automatic. Under the conditions obtaining at Newport, this installation has effected a substantial saving during the time it has been in operation.

Turning to the distribution department, there is a development now gradually taking place to which it may be useful to briefly refer, and that is the supply of gas under high pressure. This method of distribution is as yet in its infancy in this country; but notwithstanding this, it has already shown its immense possibilities, either for the complete supply of a district or the reinforcement of an existing low-pressure supply. At Newport, it is now being utilized in each of these capacities, and with the most successful results. Owing to the immense expansion of consumption by means of prepayment meters, many districts in which the demand for gas had been heretofore negligible, and for the supply of which small mains were amply sufficient, are now using considerable volumes—especially in the daytime, for cooking purposes. The laying of new trunk mains for the adequate supply of such districts merely during the hour or two for which such a peak-load continues, would in many cases be out of the question; and here high-pressure distribution exactly meets the requirements of the case. Where only comparatively small and remote districts are to be supplied, the economy effected is, of course, at once obvious.

In concluding this necessarily brief and cursory sketch, it may perhaps not be inappropriate to draw attention to the fact that, before finally deciding to introduce what at first glance appears an excellent economy, it is well to examine it carefully in its most remote bearings upon one's present working. Apparently trivial changes have often the most far-reaching effects; and it is therefore essential that we should spare no thought or pains in order to ascertain that the alteration we are proposing shall be productive of not merely apparent and superficial, but of real and ultimate economy.

The President (Mr. A. H. Brookman, Tenby) remarked that Mr. Canning's notes were of a most interesting character; and he hoped there would be a good discussion.

Mr. Thomas Acland (Llanelly) thought that Mr. Canning's contribution should prove very useful, not only to the members of the Wales Institution, but to those of other Associations as well. The very word "economy," it seemed to him, had an enchantment attached to it. "Economy," he was sure, should form a kind of watchword to every gas manager. In the first place, as Mr. Canning mentioned, they were all well aware that each gas-works was surrounded by its own special peculiarities, and what would be real economy in connection with one undertaking, might be unreal for another. Coming down to the question of carbonizing and the employment of water-gas plants, he had formed the opinion—and, of course, it was only his opinion—that an installation of water-gas apparatus was not of much use in a works of smaller dimensions than 100 million cubic feet per annum, mainly on account of the great part of the year during which the capital expenditure was lying dormant, in consequence of the plant being out of action. As to vertical retorts, if he remembered rightly he made some reference to this subject in the course of the Inaugural Address which he delivered at the meeting of the Institution at Llanelly last year. With few exceptions in this country, the system of vertical retorts had not as yet made much headway; and they found it was mostly being adopted on big works, where they could confine their verticals to one section, and use them mainly for experimental purposes. He did not think the time had yet to come when small works could make the change. He himself had noticed that with verticals the bottom end of the retort got cooled for about a yard up, when the coke was discharged into water, owing to the rush of steam. Personally, he was quite satisfied to work with the horizontal system, while he could get as good results from it as he was at present obtaining. Just now, he was engaged in erecting three settings of eights on the horizontal system, after very carefully considering the desirability of vertical retorts for so small a works as his, which had a capacity of about 100 million cubic feet a year. With regard to heats, and that sort of thing, the regenerative system of settings had come to stay. No one, he was sure, would go back to the old style of shallow settings. As to the mechanical handling of coal and coke, this must be considered very carefully and fully in the case of the smallest works. Mechanical stoking was highly desirable in works where they could afford, in the first place to find the capital, in the second to provide the money for upkeep, and in the third to maintain the plant in pretty regular working. The question of distribution was a most important one. Economies might be secured if managers considered the possibility of laying down larger mains in the first instance. Twenty-five years ago, where a side street had mains laid for the lighting of perhaps half-a-dozen consumers or one shop, the consumption was exceedingly small; but the introduction of the gas-cooker, the gas-engine, and improved lighting appliances had changed all this, and now, according to his judgment, nothing less than a 6-inch pipe should be put down a side-street if it was probable that the houses in that street would go in for free slot installations, and the gas undertaking was prepared to carry out such work. He was fitting up at the present time many houses a week on this system; and he found that he had to take up a lot of 2, 3, and 4 inch pipes, and substitute 6-inch ones, in order to supply the houses one after another throughout a street. The trunk mains, also, laid twenty or more years ago would be discovered to be too small in face of the great increase in demand and the higher pressure necessary for the proper use of the incandescent burner. The 12-10ths or so, suitable for a quarter-of-a-century ago must now be altered to at least double this at night. Mr. Canning's notes would be read carefully by every member, and considered from the point of view of the "man on the spot;" for, after all, it was the "man at the wheel" who knew best, or should know best, what was required for his particular works. Everyone would find some points of value to himself in Mr. Canning's notes.

The President said he was going to ask Mr. J. W. Helps, the President of the Institution of Gas Engineers, who had honoured them with his presence that day, to address the meeting.

Mr. J. W. Helps (Croydon), after making, in his capacity as President of the Institution of Gas Engineers, the remarks which are reported among the general proceedings at the meeting, referred at some length to Mr. Canning's notes. He said he regretted the absence of the author, because it always seemed to him that under these circumstances the discussion of a paper suffered. In the absence of the writer, one did not like to criticize a paper harshly, even if one wanted to, because there was no chance for the author to reply. He did not wish to criticize Mr. Canning's notes particularly; but if he had to offer any criticism, it would be that what Mr. Canning said was applicable more to the very large works than to undertakings of the size of those over which many of the members of the Wales Association had the honour to preside. With regard to the question of electrical power in connection with gas-works, he thought Mr. Canning made a wise remark when he said it was the sentimental aspect of the question which had prevented gas engineers in the past from taking full advantage of this important method of obtaining power. At his (Mr. Helps's) works, they did not care one little bit what was the power they made use of, if they felt it was specially adapted for the purpose they had in view at the moment. He had gas, steam, and hydraulic power, compressed air, and a large installation of electrical power; and he thought he might say that the electric plant lately put into position was not entirely undue to conversations he had had with Mr. Canning, and to opportunities he had enjoyed of inspecting his works. In cases, for instance, in which it was desired to distribute power to various parts of a works where boilers were not available, there was nothing better than an electric motor; and if only they could show that they were able to use their gas and convert it into electrical power as cheaply as they could produce steam or anything else, there was no reason why they should not adopt this method. He had seen Mr. Canning's installation, and had been charmed with it. He himself did not adopt the Telpher system simply because the local conditions at Croydon did not lead one to expect that it would be so successful as an electric crane. There were many other points that Mr. Canning had dealt with on the subject of machinery; but there was one axiom he (the speaker) would like to lay down as the result of no inconsiderable amount of experience. This was, that it was absurd for any gas engineer to go and instal power of any sort for conveying, elevating, or anything else, unless he felt quite satisfied that he could give the plant fairly continuous use. Mr. Acland had emphasized this point. Just because such things might look pretty and scientific, was no reason why they should go to the expense of putting down plant for elevating or conveying coal or coke, &c., if they could not keep it fairly constantly at work. Plant of this character would wear out almost as much from disuse as use; and they could not afford the expenditure on it in cases where hand labour would do just as well. It would be absurd for any company in the East, for instance, to try and put down machinery and do away with hand labour, when coolies were available. He had seen many a time vast numbers of coolies loading coal into the liners at Port Said;

and when these men could be secured at a very low rate of wages, it would be ridiculous to replace them by mechanical appliances, and so, notwithstanding the vast amount of machinery that would be applicable to the purpose, they still continued to load the coal into boats in the East in this manner. In the Calcutta Gas-Works, where he spent some time a little while ago, the whole of the carrying out of the coke from the retort-house was done by coolies, who took it away in baskets on their shoulders. Once the Manager (Mr. Watson) did procure some wheel-barrows; but the men would not use them. They were in advance of their time. When the coolies were induced to try the barrows, they simply filled them and then put them on their heads, just like the baskets. He had, previous to the meeting, had an opportunity of going round the President's beautiful little works; and he asked how often he emptied his purifiers. Mr. Brookman, jun., replied that sometimes they ran for two months. He knew works where they spent much money on machinery for elevating the oxide into the boxes and in taking it out; but when purification could be done for 1-8th of a penny per 1000 feet, there was nothing to be saved. He had himself at times seen huge masses of machinery engaged in operations which could have been carried out equally well by means of hand labour. It was necessary to consider carefully all the conditions before they decided to do away with hand labour and instal machinery in its place. He had had some experience with different forms of conveying plant, and had come to the conclusion that it was far better to pick up the coke and put it somewhere than to push it there. If they pushed the coke, they were bound to have much breeze, in addition to difficulties with wear and tear which would sometimes more than make up for the gain in economy of labour. High-pressure distribution was, of course, also of prime importance at the present day. He could not help thinking that Mr. Acland went a little too far when he told the members that they should never put down less than a 6-inch main where they expected houses on both sides of a street to take gas. Really, Mr. Acland had applied his own answer to this, because in the early part of his remarks he had stated that it did not pay to put down a water-gas plant in a works with an output of less than 100 million cubic feet of gas a year. He (Mr. Helps) agreed with Mr. Acland when he gave as his reason for the statement the fact that they could not afford to have the capital lying idle during some portion of the year. Take Croydon, for instance, 25 years ago the output was 280 millions, whereas now it was about 1400 millions. It would not have paid them to have spent a large amount on mains, and then to have had them lying idle for the best part of 25 years. If Mr. Acland had substituted 4-inch for 6-inch as a minimum in ordinary streets, he would, in his (Mr. Helps's) opinion, have been nearer the mark. He was not sure whether Mr. Canning was referring to very high pressure—where they talked in pounds—or simply up to 10, 12, or 20 inches of water. He thought there were many points in favour of the increase of pressure on the "booster" principle. It was of benefit to gas managers in many ways. Not only did it stave off the day of larger mains, especially where they had to send the gas a great distance, but it increased vastly the storage of the gasholders. He himself found, before he adopted "boosting," that though he had storage equal to something over 5 million feet, only about half was available, because when the holders uncupped the pressure the other lifts gave was not sufficient to furnish a proper supply during cooking hours and the hours of darkness. Now that he had "boosting," every available foot of these holders was of use, because he could draw the gas out and push it through to the town at any desired pressure. It was therefore an important fact that the adoption of this method would very often stave off the evil day when they might otherwise have to spend much money on an increase of their storage capacity.

The PRESIDENT said Mr. Helps and Mr. Acland had so thoroughly exhausted almost every point dealt with by Mr. Canning in his notes, that it left him personally little to say. They had, however, another distinguished visitor among them. He referred to Mr. Norton H. Humphrys, whose name was known far and wide in the gas profession; and he would like to ask him to say a few words.

Mr. N. H. HUMPHRYS (Salisbury) thanked the President for his kind allusions to him, and said that it was a great pleasure to him to be at the meeting. He could claim to be a Welshman himself. He had a Welsh name, and something of a Welsh pedigree; and he was very glad to visit the gas managers in Wales. There were one or two points in Mr. Canning's notes to which he would like to refer. There was one keynote running through from the beginning to the end of the notes which they would do well to bear in mind—namely, the importance of being fully acquainted with one's own works. It was quite right to talk about the need and importance of technical matters; but a young man might have a hatful of medals and no end of certificates and so on, and unless he had a business training and ability to grasp all the bearings of the undertaking he was called upon to manage, be it large or small, he would be sure to get into difficulties. They might almost say that the greater the technical training a man had received, the more necessary it was that he should possess this business ability to take hold of his surroundings. They might call the education the sails and the commercial ability the ballast. This seemed to be the keynote which Mr. Canning very rightly sounded. He remembered a local body in Wales were reminded some time ago that, being a small body, they could not have the advantages that a larger body could; and the same thing applied to the small gas-works. A 10, 20, or 30 million cubic feet works could not afford to go in for mechanical appliances that might run them into tens of thousands of pounds; but by keeping a hold on all that these things were doing, they could often pick up a hint that might prove useful when fitted in with their own circumstances. He was glad Mr. Canning took them back to the retort-house once more. Sometimes it seemed they were apt to forget nowadays that there was such a thing as a retort-house. About thirty years ago, when these Associations were first started, gas managers used to be told sometimes that they never went out of the retort-house; but he thought occasionally the converse might be applied at the present time, and they might be told they did not go into the retort-house enough. It used to be said that a manager did not go sufficiently outside his own works; but now—what with maintenance schemes, cookers on hire, slot-meters, and the electric light canvasser—it might be urged that there was some danger of them forgetting their primary duty on the works. It was true that dividends could be made or lost in the retort-house; and it was true that with all the new appliances now in use there was a possibility of very great losses in the retort-house, unless they kept their eyes upon all parts of the working. A generator or regenerator setting would not take care of itself. It required more careful attention and watching than the old-fashioned furnaces. Mr. Canning had referred to taking analyses of gases; and it was very necessary that managers should be able to do so. He himself had given a considerable amount of attention to analyzing the flue and producer gases; and he found that several precautions must be taken before they could get reliable and accurate results. If it was worth going in for at all, it was worth doing the thing well. But it did not follow that they must get the most complicated or elaborate apparatus on the market. He believed in simplicity. He had no faith in some of the things they found put before them, with perhaps a dozen little three-way stopcocks, and no end of capillary tubes. They were not much good for practical work, though they were all very well to put on a board-room shelf to impress on the directors and shareholders how scientific the manager was. But on the works they wanted something a little more simple. One thing about these complicated appliances was that they only took a sort of homœopathic dose of the gas. When one considered the quantity of gas—several thousand cubic feet—that went through a chimney in the course of 24 hours, he did not see the use of taking a cubic inch, and then proceeding to take a decimal point on a percentage of what was present. Get a substantial aspirator holding several gallons, and draw off a good sample extending over some time. In this way they could meet the difficulty, that a small quantity drawn off when they were firing-up or directly after cleaning was apt to be misleading. With a good aspirator, and two or three appliances that could be used with baryta solution and phenol phthalein as indicator, one could secure an accurate result with very little trouble. But in drawing the sample, great care must be taken that there was no risk of leakage of air into the gas. An exceedingly small crack in the chimney might often spoil the whole result. Then with reference to water supply, for some years he had provided all his own water supply at the works without much expense. They used to have a flat-rate, and were supplied at so much per annum; but some years ago the water authority took it into their heads that all water supplied for technical purposes must be furnished through a meter at 8d. per 1000 gallons. This meant about £100 a year for water. The works happened to be situated down in a valley, where the ground was simply a sponge, so they arranged to collect the rain water and pump the rest of their requirements in this respect. Thus for some time past he had been supplying all his own water for technical purposes, and only had the public supply for office use, drinking, and so on. He should think from his experience of the previous day at Tenby that it would pay them very well to collect the rain water there. But be this as it might, his plan was to collect the rain water in a cistern about 10 feet above the ground level, which was high enough to run the water to the coke bosh and regenerative furnaces by gravitation; and the rain water represented about one-fifth of their total consumption.

Calcium Chloride for Dust Prevention.—Some time ago, the Roads Improvement Association instituted some tests to ascertain the dust-laying qualities of calcium chloride, manufactured by Messrs. Brunner, Mond, and Co., of Northwich; the judges appointed to conduct the tests being Messrs. A. Dryland (County Surveyor of Surrey), H. P. Maybury (County Surveyor of Kent), Geo. W. Manning (Surveyor to the Staines Rural District Council), and W. J. Atkinson Butterfield, M.A., F.I.C. (Consulting and Analytical Chemist). Their report has just been issued. It is a comprehensive document, dealing with the nature and properties of the material, methods of treatment, analysis of the road surface after the material had been upon the road a certain time, &c. Schedules are attached giving the actual cost of applying the material and also daily observations of its effect upon the road. Summing up their report, the judges say: "We are of opinion that the results of the tests of calcium chloride applied in granular form by the 'dry' method have shown that it is a very effective dust layer, and, provided no ill-effects are experienced in winter as a consequence of the treatment, we are of opinion it is a cheaper and preferable process to that of street watering, which, as now carried out, is undoubtedly very injurious to macadamized roads."

VERTICAL RETORTS FOR SMALL WORKS.

Many managers of small works are of opinion that the more modern systems of carbonization are not for them, and are only for their admiration and interest from a distance. The Vertical Gas-Retort Syndicate, Limited, the sole licensees for the erection of installations on the Dessau system in this country, point out that this is not so for any works requiring 100,000 to 120,000 cubic feet of gas a day. Hitherto the owners of the Dessau patents have not offered to erect settings on their system of less number than four beds of eights, because they have adhered to their own arrangements for coal and coke handling. The Syndicate operating in this country have devised a cheaper method of dealing with both the coal and coke; so that they are now prepared to put up installations as small as two beds of eight 4-metre retorts, or even one bed as a trial, which single bed would meet the present needs of some of the smaller works, and would produce a little over 100,000 cubic feet a day, calculating 14,000 to 15,000 cubic feet per mouthpiece. The managers of certain small works have been making inquiry into this matter lately; so that they will be interested over this announcement.

In connection with the Sunderland installation, which was described in the "JOURNAL" for July 6, pp. 22, 25, we hear that the settings have been undergoing the process of drying during the past few weeks, and are ready for firing-up as soon as the general scheme of works construction (which was also described in the same issue) is completed.

A NAME FOR THE INTERNATIONAL LIGHT UNIT.

In the "JOURNAL" for the 31st of August (p. 565), reference was made to a short article on the above subject contributed by M. Blondel to the "Illuminating Engineer." M. Blondel, it may be remembered, suggested the advisability of having a common name for the agreed common unit of light; and he proposed either the Greek "pyr" or "phos," or a scientist's name, such as Violle. The Editor of the publication named having invited comment on M. Blondel's suggestion, Mr. Clifford Paterson, of the National Physical Laboratory, sent a few observations, which appear in the current number. Mr. Paterson asks whether M. Blondel, in desiring to name the new unit after M. Violle, does not lose sight of the fact that the value of the unit in terms of the Violle standard cannot be regarded as defined with anything at all approaching the accuracy of modern photometric methods. On the one hand, the French authorities, taking M. Violle's own ratio between the platinum unit and the carcel unit (determined in 1881), claim that the so-called "international unit" is exactly 1-20th of the candle power of the platinum standard—viz., the bougie décimale. On the other hand, the International Congress of Electricians declared at Geneva in 1896 that the bougie décimale is the same as the Hefner unit. Mr. Paterson says this unit is known to be 10 per cent. smaller than the proposed international unit; hence there is an uncertainty of 10 per cent. in the true interpretation of Violle's "platinum standard." "Is this," he asks, "really the same as the unit which is now known as the bougie décimale in France, or is it equal to the Hefner unit?" At present, England, France, and America have a common unit; but Mr. Paterson thinks most people would regard it as a mistake to attach to it the name of any one standard. The unit can be maintained at its present value almost indefinitely to a fraction of 1 per cent.; but, he says, it will be generally admitted that no present standard has been proved to be so independent of atmospheric or other conditions of test as to justify its universal and permanent adoption as representing the value of an international unit of light. Indeed, to link the unit with any standard might even prejudice people against its adoption. Should a single unit be ultimately adopted by all countries of the world, Mr. Paterson cannot agree with M. Blondel that it would be cumbersome to call it an "international unit." He points out that we are quite accustomed to the "Int. Ohm." Why not, therefore, have an "Int. Candle"—an expression which, he says, carries its meaning on the face of it, and would be understood by both technical and untechnical persons?

A pleasing little ceremony recently took place in the Board-room at the Portwood Gas-Works, Stockport, when Mr. E. G. Hutchinson, who, as already announced, has been appointed Engineer and Manager of the gas-works of the Workington Corporation, was the recipient of a kit bag and a pair of pipes from the men and staff of the Gas Department, as a token of esteem. The Corporation Gas Engineer and Manager (Mr. S. Meunier) made the presentation on behalf of the donors, and said he was very pleased to see that Mr. Hutchinson was rising in the world, and that while they were sorry to lose him, they would all wish him every success in his new position. In acknowledging the gifts, Mr. Hutchinson assured the donors that they were thoroughly appreciated; and that in years to come he would not forget the pleasant time he had spent at Stockport. He thanked them for the courtesy and kindly consideration which had at all times been accorded him, and expressed the hope that in his new sphere he might meet with the same hearty co-operation and good-will.

MANCHESTER DISTRICT JUNIOR ASSOCIATION.

Visit to Mossley.

The First Meeting of the Session 1909-10 of the Manchester and District Junior Gas Association took place on Saturday, when the members, at the invitation of the President (Mr. James Taylor), paid a visit to the Mossley Corporation Gas-Works, of which he is Engineer and Manager; this being followed by an inspection of the Chew reservoir now being constructed by the Ashton, Stalybridge, and Dukinfield Water-Works Board, among the hills which overlook Greenfield and Mossley.

The main body of the party, including Mr. E. J. Wellens (Past-President), Mr. R. H. Garlick (Hon. Treasurer), Mr. J. Alsop (Hon. Secretary), and most members of the Council, left Manchester by train early in the afternoon, and on reaching the Mossley Gas-Works, were welcomed by Alderman Noel, J.P., Chairman of the Gas Committee, who, in the course of his remarks, expressed the hope that the Association would have a profitable and enjoyable day, following out the programme arranged for them by their President—a gentleman whom the Mossley Corporation were glad to have as their Gas Engineer. Alderman Noel added that the Mayor of the borough had written to say that it was absence on a holiday that prevented his personally welcoming the members of the Association to Mossley. Mr. E. J. Wellens acknowledged the welcome on behalf of the members.

Then followed an inspection of the works under the guidance of Mr. Taylor, who had prepared the following particulars for the benefit of those present.

MOSSLEY CORPORATION GAS-WORKS.

The works originally belonged to the Stalybridge Gas Company, which was formed in 1829. In 1885, the Corporations of Stalybridge and Mossley purchased the undertaking of the Gas Company, and commenced to supply gas in their separate districts. The district supplied by the Mossley Corporation includes Mossley, a portion of Springhead, Greenfield, Uppermill, Dobcross, Diggle, Delph, and Denshaw; the six latter districts forming the Urban District of Saddleworth. On account of the hilly situation of Mossley and Saddleworth, the maintenance of suitable pressures of gas throughout the district is difficult in the extreme. The Ordnance level at the works is 470 feet above sea-level; and the district varies in altitude from 434 feet at Egmont Street, Mossley, to 964 feet at Old Tame, Denshaw. The town is situated in three counties—Lancashire, Yorkshire, and Cheshire—the gas-works being in Cheshire.

The coal-store is alongside the Manchester and Huddersfield Canal, by means of which about a fourth of the amount of coal used is delivered. The remainder is carted from the Mossley coal-sidings (L. & N. W. Ry.), distant a mile from the works. The total storage capacity is about 1200 tons.

The retort-house contains twelve through settings of eight retorts, each 22 in. by 16 in. by 20 ft. The furnaces are deep regenerators; and one furnace only is provided for each through bed. Six cwt. charges are used, of six hours duration. The total capacity of the house is 1,260,000 cubic feet per day. The equipment includes tar-mains, tar-towers, retort-house governor, &c.

The condensing plant consists of nine horizontal rows of 18-inch pipes; each row being 68 feet long.

The No. 1 exhauster is of 35,000 cubic feet per hour capacity, and is of the two-blade rotary type, belt driven by counter-shafting from a steam-engine in the adjoining room. This exhauster has been in use over forty years. The No. 2 exhauster is of 40,000 cubic feet per hour capacity, and is of Waller's four-blade rotary type, direct driven from a steam-engine on the same bed-plate, and was erected last year. A steam-engine which was taken out last year had been in continual work for over seventy years. The boilers are two in number, Cornish type, and are fitted with Meldrum's furnaces. The fuel used consists entirely of coke breeze.

Six scrubbers were originally erected; but two of them are now used for the storage of tar and ammoniacal liquor. The four which are used as scrubbers are filled three with coke and one with wooden grids. They are 7 feet in diameter by 25 feet high. A Clapham rotary washer is also used, and is supplied with clean water; weak ammoniacal liquor being used in the scrubbers.

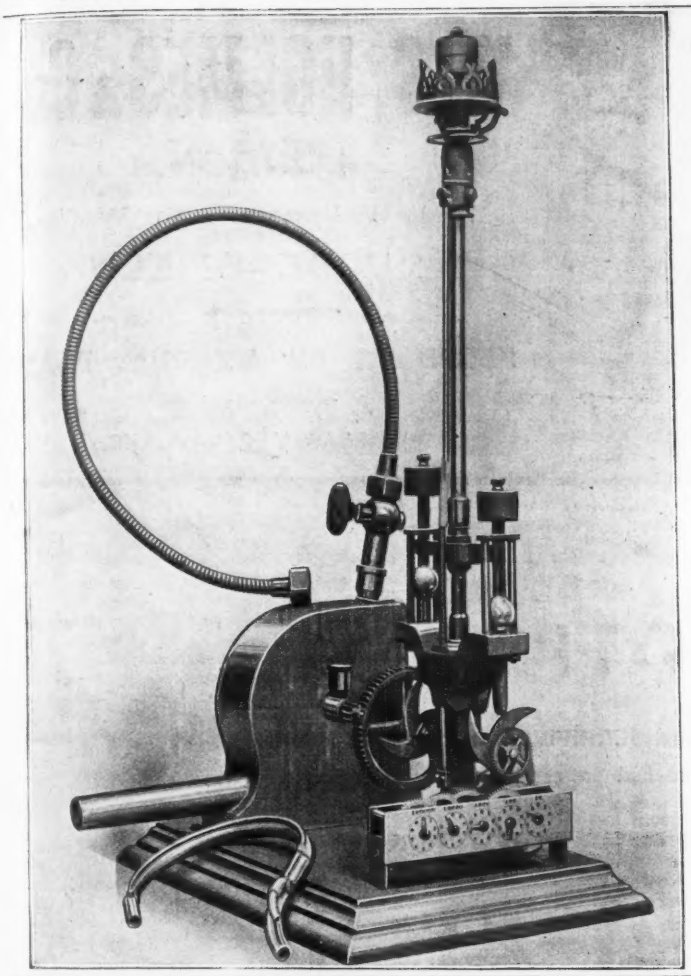
The purifiers are six in number, each 20 ft. by 18 ft. by 5 ft. 6 in. deep. The gas is first passed through a set of four boxes filled with oxide, and afterwards through two boxes filled with lime.

The station meter is of 50,000 cubic feet per hour capacity, and is of John West's make.

A carburetting plant of Parkinson's make is installed, but is only used to a very limited extent.

As to the gasholders, No. 1 is a three-lift holder, column-guided to the height of two lifts. The capacity is 590,000 cubic feet. No. 2 is a two-lift holder, and is cable-guided throughout. The capacity is 370,000 cubic feet. The total storage capacity is 960,000 cubic feet.

There are four governors; two being of Braddock's ordinary compensating pattern, and used for controlling the supply to the higher and lower levels of Mossley. The other two are Braddock's balance-governors, and are fitted with automatic pressure-changers. One supplies the Greenfield district, and the other the remainder of Saddleworth.



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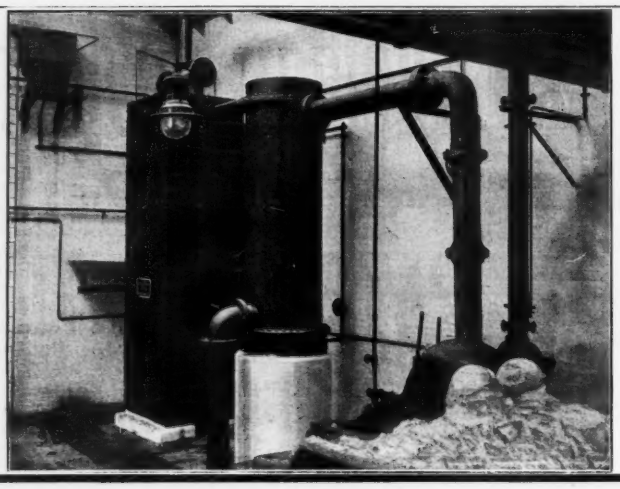

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SULPHATE OF AMMONIA PLANT

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WALLASEY GAS-WORKS.

NOTICE.

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There are 45 miles of distributing mains; and, as may be supposed from the straggling and hilly nature of the district, the unaccounted-for gas is very heavy—being 9 per cent. of the total gas made. The number of consumers is 5514, of whom 2163 are supplied through prepayment meters. The maximum gas delivered in 24 hours is 665,000 cubic feet. The quantity of gas made in the year ended March 25, 1909, was 126,369,000 cubic feet. The illuminating power supplied is 16·8 candles; and the price of gas is 2s. 8d. and 2s. 10d. per 1000 cubic feet for lighting purposes, and 2s. 5d. and 2s. 7d. for power. The district is extensive considering the quantity of gas supplied, but is very straggling. There are many mains from 1 to 2 miles in length with no more than three consumers supplied from them, apart from the street-lamps. From end to end of the district is a distance of 11 miles.

Mr. Taylor has, by installing suitable incandescent burners throughout the works, reduced the gas consumption by 800,000 cubic feet in the last nine months; and by the introduction of pneumatic switches in certain places, he hopes to still further economize. Along with this economy, there is a much more brilliant light—at least threefold. He holds strong views as to the great waste of gas which occurs in the majority of gas-works, and as to the undoubted inadequacy and inefficiency of the lighting. Mr. Taylor is an advocate for the removal of all carbonic acid from gas. He finds that much greater satisfaction is given to users of gas in incandescent burners, cookers, gas-engines, &c., with the same illuminating power; and this he attributes to the higher calorific value of the gas. By equalizing the levels of the dip-pipes and reducing the amount of seal in the hydraulic mains, together with the introduction of a retort-house governor, he is now making 1200 cubic feet of gas per ton of coal more than was formerly obtained with a similar illuminating power.

At the conclusion of the inspection of the gas-works, the party (which numbered over sixty) proceeded up the Chew Valley for a view of the new reservoir. Three miles of the journey was made by the light railway used by the Contractors; and then there was a climb of about two miles to the site of the dam. It was a pleasant October day; and the walk was greatly enjoyed. Mr. A. Lang, the Resident Engineer for Messrs. Morrison and Masons, the Contractors for the new reservoir, and Mr. F. J. Dixon, the Engineer to the Joint Water Board, acted as guides to the party, and described the work in progress.

The following is an extract from a report and history of the undertaking, prepared in view of the visit.

ASHTON, STALYBRIDGE, AND DUKINFIELD WATER-WORKS.

By Mr. F. J. Dixon, Engineer.

The district supplied by the Joint Committee consists of the following Authorities: Ashton-under-Lyne Corporation; Stalybridge Corporation; Dukinfield Corporation; Mossley Corporation; Audenshaw Urban District Council; Hurst Urban District Council; Saddleworth Urban District Council; and Limehurst Rural District Council. The parliamentary limit of supply sanctioned by the Ashton-under-Lyne, Stalybridge, and Dukinfield (District) Water Act of 1870 consists of an area of some 42 square miles, or 26,880 acres in extent. It stretches from Denton and Hyde on the south, to Diggle and Delph on the north; and from Oldham and Openshaw on the west, to Arnfield and Owl's Head on the east. The estimated population supplied at this date is between 150,000 and 160,000 persons.

The source of supply is taken from three valleys—Swineshaw Valley, Greenfield Valley, and Chew Valley, with the following drainage areas: Swineshaw, 1300 acres; Greenfield, 1170 acres; and Chew, 1730 acres—total, 4200 acres. The geological formations consist of peaty subsoil, clays, &c., resting on the millstone grit series. The average yearly rainfall over the drainage area is 48·4 inches.

There are seven impounding reservoirs; and the capacities are as under:—

	Depth.	Gallons.
Swineshaw Valley—		
Walker Wood reservoir (compensation only)	61 feet.	202,084,000
Brushes reservoir	41 ,,	52,165,000
Lower Swineshaw reservoir	33 ,,	55,500,000
Higher Swineshaw reservoir	53 ,,	168,908,000
Greenfield Valley—		
Yeoman Hey reservoir	65 ,,	205,596,000
Greenfield reservoir	62 ,,	101,686,000
Chew Valley—		
Chew reservoir (compensation only), now in course of construction	75 ,,	(say) 200,000,000
Total capacity		985,939,000

The water is conveyed from the Swineshaw Valley by 18-inch, 12-inch, and 9-inch cast-iron pipe aqueducts direct into consumption, without any filtration whatever; from the Greenfield Valley, by two 15-inch cast-iron pipe aqueducts, and up to Aug. 9, 1909, it was also sent direct into consumption, without any filtration.

As the water in the Lower Swineshaw reservoir, which supplies part of the Borough of Mossley, is somewhat of an acid nature, due to the peaty formation of the gathering-ground, it is, previous to consumption, treated with pure powdered carbonate of lime or paris white; the solution being mechanically discharged into the water which is to be treated, by means of a small apparatus driven by a water-motor, at the head of the reservoir. The quantity used is 4·28 cwt. per 1,000,000 gallons of water treated, or 3·16 grains per gallon. The cost of such treatment is 7s. per 1,000,000 gallons, or 0·084d. per 1000 gallons. This treatment has proved satisfactory, and makes the water practically neutral and non plumbo-solvent.

The water from the Greenfield reservoir, which supplied the Saddleworth district, is also somewhat acid; and under the Act of 1907 (section 19), the Joint Committee were enforced to put down filters or other apparatus to efficiently and continuously filter or chemically treat the water, so as to prevent the action of such water on lead-pipes, &c. The Committee have erected three mechanical filters of Messrs. Mather and Platt's type at the foot of the Yeoman Hey reservoir, which are now working. The water is filtered through some 3 feet of fine quartz sand and 1 foot of quartz the size of a pea, at the rate of 6000 gallons per hour each filter. Chemicals consisting of carbonate of lime and alumina ferric will be continuously injected into the water previous to the filtration. Pelton wheels drive the agitating gear in connection with the washing-out of the filters. A stone house is being erected round the filters, which will be lighted by electricity. The total cost, including filters, house, &c., is about £2500. The average working pressure at the filters is about 80 lbs. per square inch.

There are three service reservoirs, one at Knott Hill, Ashton-under-Lyne, and two at Dukinfield, which supply the respective boroughs; the water for Ashton being supplied from the Greenfield Valley, and for Dukinfield from the Swineshaw Valley. The capacities are as follows:—

	Depth.	Gallons.
Knott Hill	44 feet	64,000,000
Dukinfield	24 feet	33,000,000
Total capacity		97,000,000

Compensation water has to be supplied from the Greenfield Valley, Swineshaw Valley, and Chew Valley as under:—

Swineshaw Valley	at the rate of	801,000 gallons	per 24 hours
Greenfield Valley	,, ,,	931,680 ,,	,,
Chew Valley	,, ,,	1,376,640 ,,	,,

Total daily consumption, 3,109,320 gallons

The water for dietetic purposes is somewhat soft; being 3·3 degrees of hardness by Clarke's scale. The daily average consumption, including compensation water for the Swineshaw and Greenfield Valleys, is about 4,600,000 gallons. The working pressure in the various towns varies from 40 to 180 lbs. per square inch; the districts being divided into two—high and lower zones. The water for trade purposes is supplied through meter, except in special cases. There are some 700 water-meters in use. All water-mains for new connections are drilled and connected under pressure, also all service ferrules, which prevents interference with the supply.

The Joint Committee are now constructing their last impounding reservoir up the Chew Valley. The Consulting Engineers for these works are Messrs. G. H. Hill and Sons, of Manchester; and the contractors, Messrs. Morrison and Mason, of Glasgow. The estimated cost, including all subsidiary works, is about £110,000. The area of water impounded is 43·5 acres. The length of the earth dam is 990 lineal feet, with 363 lineal feet of a north wing trench. The capacity of the reservoir when full will be about 200,000,000 gallons. The level of the top-water will be 1600 feet above Ordnance datum. The core of the embankment is to be made of clay puddle (obtained from the Micklehurst district some 3 or 4 miles distant from the reservoir), which will rest on a cement concrete cradle or shoe. The greatest depth in the excavation of the trench is about 110 feet below the surface of the ground.

Compliments to the Gas Engineer.

On returning to the Mossley boundary, special tramcars conveyed the party to the Argyle Hall for tea. Alderman Noel presided, and was supported by Alderman H. Sykes and a number of Town Councillors, including members of the Gas Committee.

Mr. A. L. Holton, proposing a vote of thanks to the Chairman and members of the Mossley Gas Committee, and to Mr. Taylor for the arrangements they had made to entertain the party, said they had had made evident to them the difficulties which the Mossley Corporation and their Gas Engineer had to contend with, not only because of the scattered area they were called upon to supply, but owing to the hilly district within their boundary. There were many lessons to be learned from even the smallest of gas-works by members of their Association; and Mossley had proved no exception to the rule. The questions put during the afternoon's proceedings indicated more than words could convey the appreciation of the members taking part. If the Mossley Gas Committee were glad to call Mr. Taylor their Engineer, the Association were pleased to call him their President.

Mr. C. Berry seconded, and in the course of his remarks said that from what they had seen of the Mossley Gas Committee and the relationship existing between them and their Engineer, it was clear that Mr. Taylor's lot had fallen in a pleasant place. He could assure the Mossley Gas Committee that they had got hold of a Manager second to none, for a good many miles round there, at any rate.

The motion having been carried, Alderman Noel responded first. He paid a high compliment to Mr. Taylor's abilities; adding that they had found him to be an honourable and straightforward business man to deal with. Never in the history of the Council

had they had such pleasant work in connection with the gas undertaking as was the case to-day. What was more, he not only esteemed Mr. Taylor as their Gas Manager, but as a personal friend.

Mr. Taylor, also responding to the vote of thanks, referred to the generous way his Committee had met him in catering for the visit of the members that day. He could assure Mr. Berry and other members of the Association that, if their lot fell on such pleasant lines as his at Mossley, they would have no occasion to be dissatisfied.

County Councillor Bradbury, a member of the Corporation, who serves on the Gas-Works Sub-Committee, had also something to say in appreciation of Mr. Taylor, when called upon by the Chairman to respond to the vote of thanks. He briefly referred to what their Engineer had done since his appointment in overhauling the different departments at the gas-works. In Mr. Taylor, the Council recognized that they had an able and conscientious official—a man who was thoroughly straight, and those present knew what that meant—a man who could not be bought and could not be sold. In a year or two, they hoped to have at Mossley as good a gas-works as anywhere, for the size of the place; and he hoped Mr. Taylor would not look elsewhere until this had been accomplished, at any rate.

Alderman H. Sykes likewise had praise for Mr. Taylor's management of the gas-works. He was, he said, an official who had the confidence of every member of the Gas Committee.

On the motion of Mr. C. Woodhouse, seconded by Mr. Hill, a cordial vote of thanks was passed to Mr. Dixon and Mr. Lang for conducting the party over the works at the Chew reservoir and explaining the different phases of the undertaking. Both gentlemen, in response, said in effect that they were only too pleased to have rendered service to the party, and to have done something to make the visit interesting.

A vote of thanks to the Chairman, proposed by Mr. J. Sykes and seconded by Mr. E. J. Wellens, concluded the proceedings. Then by rail or tram the visitors started for home, having spent a very pleasant day.

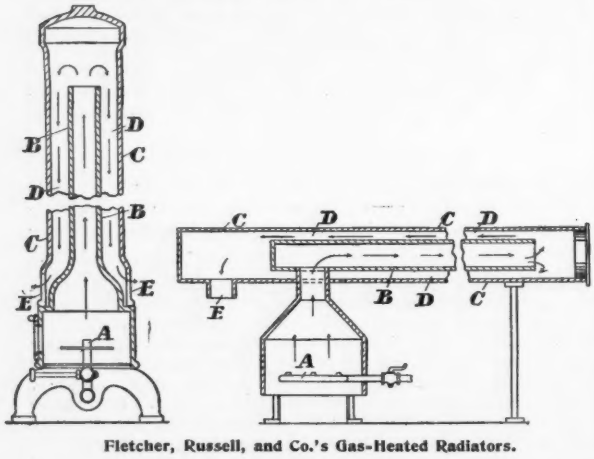
REGISTER OF PATENTS.

Gas-Heated Radiator.

FLETCHER, RUSSELL, AND CO., LIMITED, NEIL, J., and FLETCHER, T. W., of Warrington.

No. 18,466; Sept. 3, 1909.

This gas-heated radiator (either vertical or horizontal) consists of two tubes of different diameters, the larger one having the end farthest from the gas-burner closed but open at the base, and the smaller tube inserted therein, with one end placed over the burner. The inner end of the tube is open and extends to within a short distance of the closed end of the larger tube, so that the heated air passes through the smaller tube into the closed end of the larger tube and returns between the inner and outer tubes to the outlet.



Fletcher, Russell, and Co.'s Gas-Heated Radiators.

In the vertical radiator, the burner A is placed at the base of a tube B with an enlarged mouth. The upper end is open. A tube C, of larger internal diameter, is fitted over the tube B, with the upper closed end at a little distance from the open end of the tube. The heat from the burner passes up the tube C and down the space D between the tubes B and C to the base, where it passes to the open through the apertures E, or may be conveyed to the outside of the building.

If a radiator of horizontal form is required, the construction of the tubes is the same as before described; but the tube B is formed with an elbow at a convenient distance from the burner.

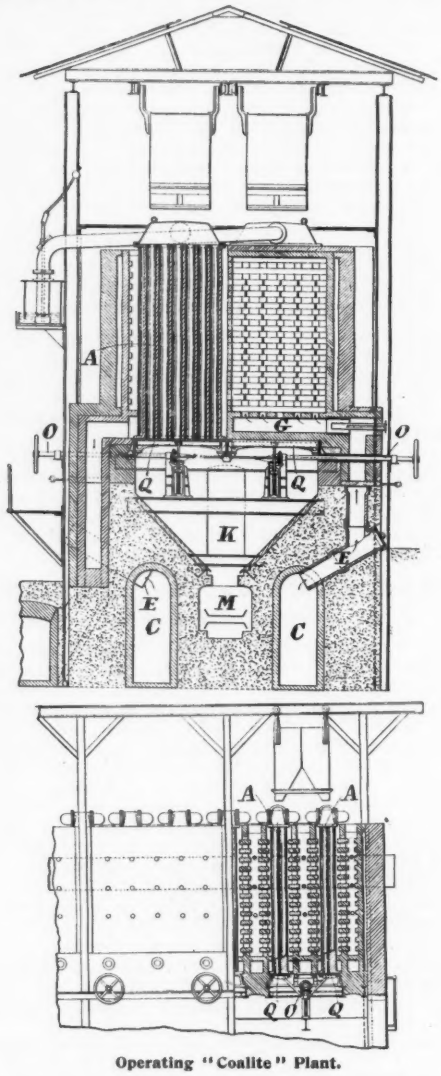
In this way, the heated air from the centre tube passing down between the inner and outer tubes "enables an even temperature to be maintained throughout the length of the tubes, and all fumes arising from combustion can be exhausted outside the building."

Destructive Distillation of Coal—"Coalite" Process.

PARKER, T., of Wednesfield.

No. 14,167; July 3, 1908.

This apparatus comprises a number of groups of retort-tubes with mixing-chambers disposed between the groups for the intimate mixture of the gas and air used for heating the retorts; the gas being led thereto from gas-chambers arranged within the setting, and valves being provided for the regulation of the supply of air and gas. Two gas-chambers provided within the setting are each connected with a number of transverse mixing-chambers above them by separate conduits having means for the regulation of the quantity of gas passing; and the admission of air to the mixing-chambers is controlled by a valve consisting of a pipe extending through the brick setting, closed at the inner end, and provided with a lateral air-slot—the passage of air being controlled by sliding the pipe in or out as the case may be.



Operating "Coalite" Plant.

Vertical sections of the apparatus, at right angles to each other, are shown.

The two series of batteries of retort-tubes or retorts A are disposed in line parallel to each other, with a brickwork setting intermediate of the batteries through which gas is led on either side for heating the retorts. Gas-chambers C provided in the setting beneath the retorts are disposed transversely to the batteries, and the producer or water gas is led from these chambers through inclined conduit pipes E, the upper extremity of which on each side lies near the side face of the setting, and is closed by a loose door "suitably luted, so that in case of an explosion the cover is easily forced away—thus relieving pressure and avoiding destruction of the setting."

Through the conduit-pipes on each side gas is led upwards and into mixing-chambers G near the lower part of the series of retort-tubes. Into each of the chambers air is admitted from a tube with a closed end mounted so as to extend to the outside and provided with lateral slots "through which air may pass into the mixing-chamber, so that the admission of air for the purpose of combustion may be capable of regulation according to the extent to which the air-tube is projected into, or withdrawn from, the mixing-chamber to increase or reduce the area of the lateral slots open to the passage of the air."

Above the chambers C, and below the lower ends of the retorts, a chamber K is provided, formed at its lower part "with inclined walls of the usual type, by which the residue of the distillation, on its discharge, may be broken on its fall" and pass into a space M running centrally in the setting, within which a conveyor is provided to carry the discharged mass outside the furnace. The chamber K is of such

height that the charge in the retorts falls on to the inclined walls of the chamber, and is thus "broken into pieces of convenient size."

Between the gas-chambers C and the mixing-chambers G, suitable valves are provided, so that "any particular mixing-chamber may be cut out according to the requirements of working."

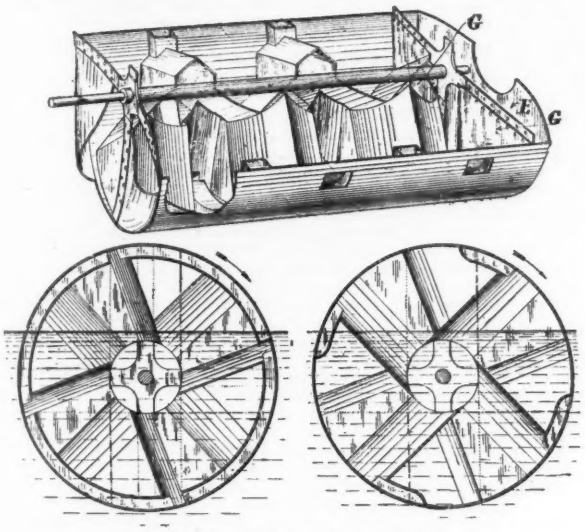
The chamber K serves at the same time to carry the gear by means of which the lower cover plates Q of the retorts are opened and closed by mechanism deriving movement from outside the furnace; a shaft O (with gear) being provided to permit of the lower cover plates for the respective series of bunches of retorts being operated from the respective sides of the setting.

Gas-Meters.

COMPAGNIE POUR LA FABRICATION DES COMPTEURS ET MATÉRIEL D'USINES À GAZ, of Paris.

No. 18,851; Sept. 8, 1908. Date claimed under International Convention, Sept. 11, 1907.

This invention relates to a gas-meter cylinder having propellers each of which is bent so as to constitute partitions inclined in opposite directions relatively to the axis of the cylinder, and forming compartments each composed of a series of buckets so shaped that, when the cylinder rotates, the various buckets forming a compartment are disconnected from each other owing to portions of their surfaces being immersed in the water. Each bucket is also provided with a conduit or other means of communication with a bucket in the compartment preceding in the movement of rotation, and with a conduit opening through the wall of the cylinder.



A French Gas-Meter Cylinder.

The patentees point out that the cylinder for gas-meters which forms the subject of their invention differs from similar apparatus by a special construction and arrangement of propellers separating the compartments, with the object of facilitating the movement of the propellers in the water, and enabling a cylinder thus designed to handle a given volume of gas with a much smaller driving effort—in other words, with a smaller absorption of pressure—than that required by a cylinder of the same power constructed in the usual manner. If, on the other hand, in constructing a cylinder according to this invention, it is desired, instead of greatly reducing the absorption of pressure, merely not to exceed a given absorption, the cylinder could be made of smaller dimensions than a cylinder of the same power of ordinary construction, absorbing the same pressure.

In the construction of gas-meters of the kind at present in use, they continue, it has been found necessary to arrange the propellers dividing the drum into compartments at an angle, or inclined relatively to the axis, because if they are arranged along the generatrix of the drum they act like a paddle-wheel in water, and consequently produce a great disturbance of the water and bring about a considerable absorption of pressure. The propellers of a cylinder move in water at a speed which is greater as the angle in question is greater; but the angle or inclination must not be allowed to exceed a certain limit, or the useful capacity of the compartments will be reduced and the regularity of working of the meter be affected.

In order to obtain the best possible utilization of the pressure of the gas with the greatest efficiency, it is usual to give to the ordinary cylinders a length measure along the generatrix approximately equal to their diameter. If these proportions are modified by considerably increasing the diameter, it is possible to remain within the admitted limits of absorption of pressure only on condition of reducing the speed of rotation. If, on the contrary, the length is increased, the inclination (or the angle) of the propellers is thereby reduced, which brings about movements and disturbances of the water, and produces the same result as the increase of diameter. It has, however, been proved by them that, by increasing the length relatively to the diameter, it is possible to reduce the dimensions of the cylinders provided the inclination of the propellers remains within the limit of useful capacity. Such a construction is shown in perspective horizontal section of a gas-meter cylinder for large volume, in which the buckets are arranged longitudinally in several series; also in cross sections.

The compartments, instead of being separated by regular propellers or by planes slightly inclined relatively to the axis, are divided by bent propellers into compartments; the propellers being of such a shape as to form a number of partitions which are alternately inclined in one and in the other direction to the degree desired for obtaining the maximum of speed. The gas penetrates into the chamber E of the cylinder, and passes over the edges of the extreme partitions G into the different buckets shown; and then, by means of the outlet edges, it escapes in the same manner as in ordinary cylinders. It must, however, be pointed out that at the moments when any compartment—a compartment representing the volume comprised between the outer wall of the cylinder and two adjacent propellers—commences to be filled with gas, or completes its exhaustion, some of its parts are without any communication with the inlet or outlet orifice. It is thus necessary that the parts should be put into communication in a special manner with the gas inlet or discharge.

Incandescent Mantles for Inverted Burners.

FRIEDEBERGER, L., of Schoeneberg, Berlin.

No. 24,630; Nov. 16, 1908.

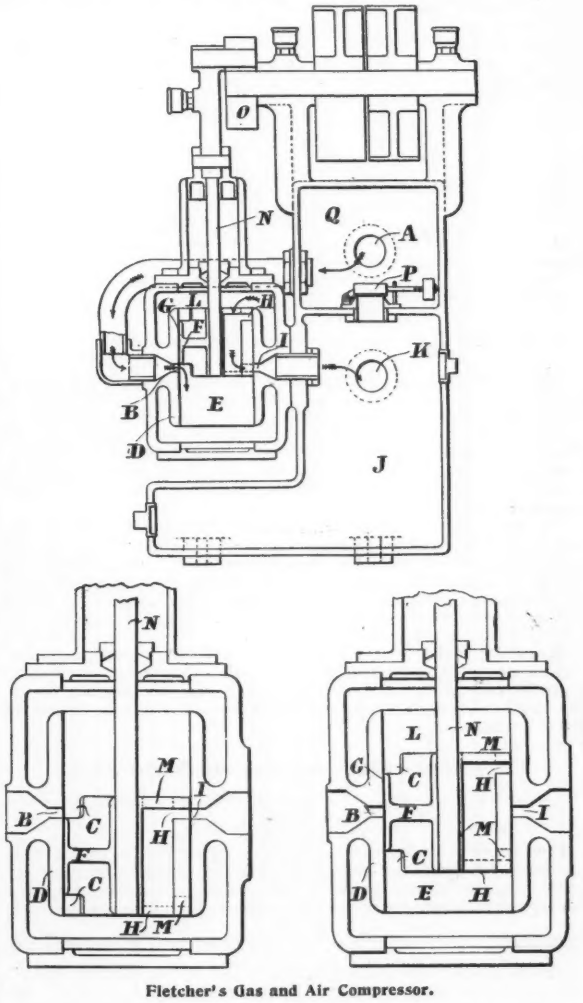
This present invention refers to fastenings for incandescent mantles of the inverted kind, in which the mantle is fastened to the fixed supporting ring or holder and strengthened by the addition of a separate piece of woven fabric. The invention consists in the provision of a ring-like strip of flexible (as far as possible), pervious, fire-proof, and bad heat-conducting material (for example, asbestos tissue) that is itself fastened directly to the supporting ring and serves to support the edge of the mantle around its whole circumference, and does not come in contact with the supporting ring—it being simply attached to the edge of the flexible ring. There thus results "the essential new effect that the mantle is not only rendered incandescent and hardened throughout—that is to say, even the uppermost portion situated next to the support—and the disadvantage of the incandescent mantle easily breaking off at the point of suspension is avoided, but the arrangement permits at the same time of automatically forming the mantle on the burner itself."

Gas and Air Compressors for Lighting and Heating Purposes.

FLETCHER, E., of Tottenham.

No. 26,719; Dec. 9, 1908.

This apparatus, for the compression of gas and air, comprises a piston having two portways through it, each communicating between a



Fletcher's Gas and Air Compressor.

chamber at either side of the piston face, and with an outlet port to the reservoir (or burner) for the emission of the high-pressure gas; the chambers being alternately open, through ports in the piston, to an inlet

port in the cylinder communicating with the source of supply, whereby the low-pressure gas and air admitted through the inlet port are compressed and fed to the reservoir or burner.

The illustrations show the plant referred to, with the piston at various positions of its stroke.

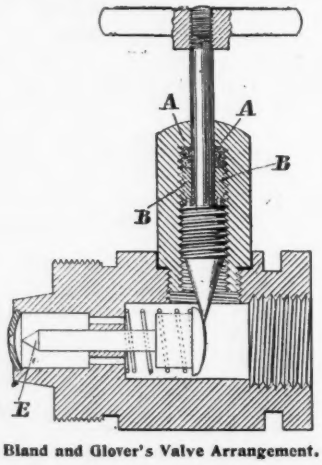
When air and gas enter the apparatus through the port A, the mixture passes to the inlet ports B C in the cylinder D and piston respectively, to the chamber E. On the return stroke of the piston F, the port B is closed by the edge of the piston G, and the gas and air in the chamber E are compressed until the end of the stroke, when the portway H, connected with the chamber, will have come opposite to the outlet port I, through which the compressed air and gas will escape to the chamber J, whence it is led, through the port K, to the point of consumption. On the next (backward) stroke of the piston, the chamber L will have been filled with gas or air, which will be compressed throughout the stroke, until the portway M comes opposite to the outlet port I, through which the compressed air and gas will escape to the chamber J, and thence, by the port K, to the point of consumption. The piston-rod N is supported in standards and coupled to the wheel O, which is driven by a pulley and shaft. P is a bye-pass, weighted to any predetermined pressure, so that when the pressure in the chamber J exceeds the required maximum, it will be automatically opened, and the excess pressure allowed to escape to the inlet chamber Q, whence it will again pass through the port B into the compressor; the bye-pass remaining open until the volume of air and gas in the chamber J has been reduced to the predetermined pressure, when it will again automatically close.

Stuffing-Box for Gas-Valves.

BLAND, C. W., of Little Trinity Lane, and GLOVER, T., of Queen Victoria Street, E.C.

No. 26,961; Dec. 11, 1908.

This invention consists of an improved construction of stuffing-box applicable for use with gas, water, air, steam, or other liquid or fluid valves, and is shown in sectional elevation as applied to a gas-valve for incandescent gas lighting (preferably inverted).



Bland and Glover's Valve Arrangement.

The stuffing-box is made with an internal flange A at one end leaving a hole for the reception of the rod. The inside of the stuffing-box is screw-threaded, and the packing material is at the flanged end, held in place by a loose collar or gland B screwed into the box and pressing the packing material on to the rod and the flange and wall of the stuffing-box, so as to ensure a tight joint. One end of the gland is provided with holes, slots, pins, or other means to enable it to be screwed-home or unscrewed by a tool.

The stuffing-box is especially applicable for gas and water valves; and the end C of the gland may be roughened or cut, as also is the end of the screw portion of the rod, so that the packing can be tightened in the box by the screw portion of the rod gripping or engaging the end of the gland and turning it in the box—the gland remaining at the placed position on the return movement of the rod. The stuffing-box forms part of, or is connected to, the apparatus.

When used for inverted incandescent gas lighting, the rod has a coned end, which acts upon the head of the valve E. The end is normally held away from the gas-nozzle by a coiled spring; but by operating the rod, the coned end acts upon the head and pushes the end of the rod nearer to the gas-nozzle.

Power-Gas Plant for Use on Board Ship.

OSWALD, T. H. & T. H., JUN., of Fenchurch Street, E.C.

No. 5581; March 8, 1909.

This invention relates to the adaptation of suction-gas engines and producers for propelling vessels of all kinds, whereby sea water is treated so as to produce the necessary vapour for admixture with air in the process of generating power gas by which the engines are operated.

Fatal Case of Gas Poisoning.—A verdict of "Accidental death" was returned at an inquest held at Kilburn on Monday last week on the body of George Mont, aged 62, a retired grainer, of Victoria Road, Kilburn, who was found dead in bed the previous Friday morning, with his room full of coal gas. An inspector of the Gaslight and Coke Company explained that a gas-bracket had become defective from age and decay, and had allowed the gas to escape.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Fuel and Metallurgical Department at Leeds University.

SIR,—I should feel much indebted to you if you would be so good as to intimate to your readers that it would materially help us in arranging for the delivery of special lectures in "Gas Manufacture" during the coming winter, if intending students would as soon as possible send in their names to me.

I may say that the course, in the "Manufacture and Distribution of Coal Gas," given here during last winter by Dr. Colman and Mr. Hole was very successful, from the point of view both of attendance and of general interest shown in it; and although it was only sanctioned by the University by way of an experiment for one session, the results were such as would probably justify its repetition as a more permanent feature of our work, if a sufficient number of intending students send in their names within the next few weeks. The lectures would probably be given twice weekly (Wednesdays at 6 p.m. and Thursdays at 9 a.m.) during ten successive weeks between January and March, 1910—the arrangement of times being precisely as last winter.

I am personally anxious to propose a scheme of special lectures in the "Technology of Coal Gas and Gaseous Fuel," which shall be more comprehensive in scope than the limited scheme last winter, and shall extend over two or three years, instead of only one season; so that students from a distance who are engaged in works may derive the best possible advantages in the way of systematic advanced study. But, as you will readily understand, the prospect of the early consideration, not to say the adoption, of a more extended scheme than that of last winter would be materially enhanced if we were assured, during the next few weeks, of a good response to our proposals for the coming winter.

Leeds University, Sept. 28, 1909. WILLIAM A. BONE.

Technical Classes.

SIR,—Now that so much interest is taken in the spread of technical and commercial education, the following particulars of the work done in this direction by the Bournemouth Gas and Water Company may be of interest to other gas undertakings (who may be thinking of moving in the same direction), as showing the extent to which local authorities are prepared to go in assisting the spread of technical education.

For the past four years, classes have been held at the gas-works in "Gas Manufacture;" and during that time seven passes were obtained in the Honours Grade and 21 in the Ordinary Grade. Last year a class was formed in "Gas Supply;" and six passes were obtained in the Ordinary Grade. This year, these classes will be continued; and an attendance of from 20 to 25 students is expected.

The Bournemouth Education Committee have this year arranged a four years' course as follows:—

First Year—Elementary chemistry, drawing, and arithmetic.
Second Year—Drawing, arithmetic, and gas manufacture.
Third Year—Mathematics, building construction, or machine drawing, gas manufacture or supply.
Fourth Year—Advanced gas manufacture or supply, building construction, and machine drawing.

This course is arranged for the benefit of the younger fitters, maintenance lads, &c.; and already 43 names have been given in of employees wishing to take the course.

In addition to this, another 26 of the Company's employees are attending classes, held at the School of Art, in chemistry, machine drawing, mathematics, French, &c. The classes in gas manufacture and supply are taught by members of the Company's staff; and the Company pay all fees, &c., for classes held at the school.

H. W. WOODALL, General Manager,
Bournemouth Gas and Water Company.

Bournemouth, Sept. 29, 1909.

American Combined Vertical Retort and Water-Gas Generator.

SIR,—On looking over the "JOURNAL" for May 11, on page 372 I notice, in referring to patent No. 16,614, that the word "air" appears on the drawings accompanying the specification, whereas it should be "oil" in place of "air." A correction will be appreciated.

INTERNATIONAL GAS DEVELOPMENT COMPANY.

VICTOR A. RETTICH,
Second Vice-President and Engineer.

New York, Sept. 18, 1909.

[The mistake is the engraver's, who, reproducing the Patent Office drawings referred to, misread a very indistinctly-written word "oil" for "air."—ED. J.G.L.]

Additional Capital for the Aldershot Gas, Water, and District Lighting Company.—As will be seen from an announcement which appears elsewhere, Messrs. A. & W. Richards have received instructions from the Directors of the above-named Company to offer for public competition, at the Auction Mart, Tokenhouse Yard, on the 26th inst., two new issues of capital, each of the nominal amount of £5000. One issue is of consolidated preference stock, and is entitled to a dividend of 4 per cent.; and the other is of "C" consolidated stock, which ranks for a maximum dividend of 5 per cent. per annum. The new capital is required for the acquisition of the undertakings of the two Companies purchased under the provisions of the Act obtained in the present session, and noticed in the "JOURNAL" for the 21st ult. (p. 747), for the laying of the necessary mains to connect up the respective works, and for other extensions.

PARLIAMENTARY INTELLIGENCE.

GAS AND WATER PROVISIONAL ORDERS FOR 1909.

The Board of Trade have issued their report on their proceedings under the Gas and Water Works Facilities Act, 1870, during the present session. It shows that in December last eighteen applications were made to the Board for Provisional Orders—fourteen relating to gas and four to water undertakings. The amount of capital proposed to be authorized was £267,500 by shares and £81,663 by loan—£190,000 share and £59,663 loan capital being for gas, and £77,500 share and £22,000 loan capital for water purposes. The Gas Orders related to Bideford, Brough and Elloughton, Bude, Coatbridge, Comber, Compstall, Fermoy, Hayfield, Langley Mill and Heanor, Llynvi Valley, Long Eaton, Prestatyn, Settle, and Sutton and Hooton District; and the Water Orders to Bradfield, Gravesend and Milton, Hungerford, and Kingswood.

Gas Orders.

The principal objects of the applications in regard to gas were as follows: To authorize the Bideford Gas Company to construct and maintain additional works and raise further capital. To empower the Brough, Elloughton, and District Gas Company and the Bude Gas Company to raise additional capital, and the latter Company to maintain gas-works and extend their limits of supply. To authorize the Coatbridge Gas Company to reduce the illuminating power of their gas; and the Comber Gas Company to maintain and continue existing the works, and manufacture and supply gas in part of the parish of Comber in the county of Down. To authorize the maintenance and continuance of existing gas-works, the construction and maintenance of additional works, and the manufacture and supply of gas in the parish and urban district of Compstall, in the county of Chester, and in the parish of Ludworth, in the county of Derby. To empower the Fermoy Gas Company to maintain and continue their works, and manufacture and supply gas in the Urban District of Fermoy, in the county of Cork; and the Hayfield Gas Company to maintain and continue their existing works, construct and maintain further works, and manufacture, store, and supply gas in the parish of Hayfield, in the county of Derby. To extend the limits of supply of the Langley Mill and Heanor Gas Company, and to empower the Company to acquire additional lands for the storage of gas and residual products, and raise additional capital. To give permission to the Llynvi Valley Gas Company to raise new capital. To provide for the transfer to the Long Eaton Gas Company of the undertaking authorized by the Sandiacre Gas Order, 1905, to extend the limits of supply of the Company, and to authorize them to construct additional works and raise more capital. To authorize the raising of additional capital for the Prestatyn Gas undertaking; to empower the Settle Gas Company to obtain additional capital and construct works; and to enable the Sutton and Hooton Gas Company to construct and maintain further works, extend their limits of supply, and raise more capital. Four of the applications—those from Comber, Compstall, Fermoy, and Hayfield—were in respect of existing non-statutory undertakings. All the others had reference to undertakings already authorized by Special Acts or Provisional Orders.

There was no opposition to the Brough and Elloughton, Bude, Comber, Langley Mill and Heanor, Llynvi Valley, and Sutton and Hooton applications. Objections were lodged in respect of each of the remaining applications, but were withdrawn in the cases of Bideford, Compstall, and Hayfield. Those relating to the Coatbridge, Fermoy, Long Eaton, Prestatyn, and Settle applications were fully considered by the Board of Trade; and in the case of Long Eaton, a local inquiry was held on behalf of the Board by Mr. Hamar Greenwood. A Provisional Order was granted in each instance, subject to such modifications and amendments as seemed to be required.

In the following Orders, a maximum price per 1000 cubic feet of gas was fixed: Brough and Elloughton, 5s. 3d.; Comber, 5s. 9d.; Compstall, 4s. 6d.; Hayfield, 4s. 6d.; and Llynvi Valley, 4s. 9d. In the Fermoy Order, the Board of Trade allowed a standard price of 5s., with a sliding-scale as to dividends; and in the Coatbridge Order the existing authorized standard price of 2s. 6d., with a "neutral zone" between 2s. 6d. and 3s., was modified by the abolition of the "neutral zone."

An illuminating power of 14 candles was prescribed in the Brough and Elloughton, Comber, Compstall, Fermoy, Langley Mill and Heanor, Llynvi Valley, and Long Eaton Orders; and of 15 candles in the Bideford and Coatbridge Orders. The prescribed illuminating power previously required in respect of the Brough and Elloughton undertaking was 12 candles; at Long Eaton it was 15 candles; and at Coatbridge 20 candles.

In the Bideford Order, provisions were inserted with regard to the disposal of a part of the balance carried forward at the end of the year; and the promoters have within six years to reduce this balance to a sum not exceeding one year's dividends. In the Coatbridge Order, the promoters were required, in consideration of the reduction allowed in the prescribed illuminating power of the gas, to supply new burners to consumers free of charge. In the Fermoy Order, the standard rate of dividend on the original capital was fixed by the Board at 8 per cent.; but the rate was reduced to 7 per cent. by the Parliamentary Committee to whom the Bill to confirm the Order was referred. In the Hayfield Order, an agreed clause was inserted providing for the sale of the undertaking, in certain circumstances, to the Hayfield Rural District Council. Clauses were inserted in various Orders for the protection of road and other authorities.

Water Orders.

The principal objects of the applications for Water Orders were as follows; To empower the undertakers of the Bradfield Water-Works to construct and maintain additional works, extend their limits of supply, and increase the capital of the undertaking. To confer upon the Gravesend and Milton Water Company power to construct additional works and raise more capital. To authorize the Hungerford Water Company to use and maintain their existing works, and acquire lands for additional works for the supply of water in the parish of Hungerford, in the county of Berks. To give authority to the Kingswood Water Company to construct and maintain works, and supply water in the parish of Kingswood in the county of Surrey. With the exception of the Kingswood Water Order, which was in respect of a new undertaking, all the applications referred to undertakings already authorized by Special Acts or Provisional Orders.

Objections were lodged against the Gravesend and Milton and the Kingswood applications. In both cases the promoters failed to obtain the consents of some of the local and road authorities concerned, and requested the Board to exercise their powers, under section 4 of the Gas and Water Works Facilities Act, 1870, and dispense with such consents. A local inquiry was held on behalf of the Board with regard to the Gravesend and Milton application; and the Board decided to dispense with the consents of the Gravesend Corporation and the Northfleet Urban District Council, and grant the Order, subject to an alteration of the basis of the charges for water supplied by the promoters from rack-rent to rateable value, and an alteration of the present authorized scale involving a reduction of charges in the case of the smaller consumers. An inquiry was held at the office of the Board with regard to the application in respect of Kingswood, which was opposed by the Reigate Corporation, the East Surrey Water Company, and the Sutton and District Water Company. Having regard to all the circumstances, the Board decided to refuse the application. The Bradfield and Hungerford applications were unopposed; and Provisional Orders were granted by the Board in each case, subject to such modifications and amendments as seemed necessary.

Confirmation of Orders.

Bills to confirm the Orders granted by the Board were introduced as follows: In the House of Commons, the Gas Provisional Orders Bill, to confirm Orders relating to Prestatyn Gas and Fermoy Gas. In the House of Lords, the Gas Orders Confirmation (No. 1) Bill, to confirm Orders relating to Bideford Gas, Bude Gas, Comber Gas, Compstall Gas, and Hayfield Gas; the Gas Orders Confirmation (No. 2) Bill, to confirm Orders relating to Brough and Elloughton Gas, Langley Mill and Heanor Gas, Long Eaton Gas, Settle Gas, and Sutton and Hooton District Gas; and the Gas and Water Orders Confirmation Bill, to confirm Orders relating to Coatbridge Gas, Llynvi Valley Gas, Bradfield Water, Gravesend and Milton Water, and Hungerford Water.

Petitions were lodged in the House of Commons against the Gas Provisional Orders Bill by the Prestatyn and Fermoy Urban District Councils respectively. The Prestatyn Council were promoting a Bill for the purchase of the local gas undertaking, and the Local Legislation Committee, to whom the Bill and the Provisional Order were referred, passed the Bill, and rejected the Order. The Committee to whom the Fermoy Gas Order was referred decided to pass it, subject to amendments relating to capital, dividends, and price of gas. The remaining stages of the Bill passed without further opposition.

The Gas and Water Orders Confirmation Bill was petitioned against in the House of Lords by the Coatbridge Town Council in respect of the Coatbridge Gas Order, and by the Glamorgan County Council in respect of the Llynvi Valley Gas Order. The Committee to whom the Bill was referred passed the Orders, subject to certain amendments in the case of the Coatbridge Order, and without amendment in the case of the Llynvi Valley Order. The Coatbridge Town Council also petitioned against the Coatbridge Gas Order when the Confirmation Bill was before the House of Commons, and the Committee who considered the Bill passed the Order with certain further amendments.

With these exceptions, the Orders were unopposed; and all the Confirmation Bills received the Royal Assent on the 16th of August, except the Gas and Water Orders Confirmation Bill, to which the Royal Assent was given on the 20th of September.

Bradford Corporation Going to Parliament Again.—At a meeting of the Parliamentary Sub-Committee of the Finance and General Purposes Committee of the Bradford Corporation, held at the Town Hall last Wednesday, the question of the promotion by the Corporation of a Bill in Parliament next session was again considered. Last year, it may be remembered, the Corporation framed two Bills; but, owing to the project being defeated at a ratepayers' meeting, they were withdrawn. The Sub-Committee provisionally decided to promote a Bill to acquire certain of the powers included in last year's Bills—one being the purchase of Messrs. Ripley's gas-works.

Liversedge and the Heckmondwike Gas Undertaking.—The first of a series of ward meetings promoted by the Liversedge District Council was held last week at Norristhorpe, to consider the proposal which has been made that the Heckmondwike and Liversedge District Councils should promote a Bill for the acquisition of the undertaking of the Heckmondwike Gas Company. Figures were given which it was held would justify the authorities in purchasing the gas-works, though it was made quite clear that the ultimate decision, whether to proceed or not, would be left with the ratepayers. Considerable opposition to the promotion of a Bill was offered; one speaker suggesting that the acquisition of the gas-works by the two Councils would involve an addition to the rates of 1s. in the pound. No vote was taken.

Cirencester Gas Company, Limited.—At the ordinary general meeting of this Company last Wednesday, the Directors submitted the report and accounts for the year ended the 30th of June. They showed a balance of £2731 in respect of profits; and, after allowing for interest on debentures and the interim dividend, this was sufficient to pay final dividends, which the Directors recommended should be after the rate of £12, £6, and £8 8s. per cent. on the different shares—making with the interim dividend, paid in April last, £11, £5 10s., and £7 14s. per cent. for the year. The Directors reported that there had been a steady progress in the undertaking, notwithstanding that a few of the larger consumers had adopted electric and acetylene gas lighting. The number of prepayment meters exceeded 760; and the cooking-stoves used with them and with ordinary meters were upwards of 1000. Under the supervision of Mr. E. M. Beecham, the Manager, the plant and mains had been kept in good order, chiefly out of revenue.

LEGAL INTELLIGENCE.

RESPONSIBILITY FOR A DEFECTIVE FOOTPATH.

At the Liverpool County Court, on Monday last week, before his Honour Judge SHAND, the Liverpool Corporation and the Gas Company were joint defendants in an action brought by Mrs. Elizabeth Braley, a widow, to recover damages for injuries sustained by her as the result of falling on the pavement near her house on the night of the 12th of April last, in consequence, as she alleged, of it having been left in a defective state.

Mr. RUDD appeared for the plaintiff; Mr. RIGBY SWIFT (instructed by the Deputy Town Clerk) represented the Corporation; and Mr. A. H. MAXWELL (instructed by Messrs. Garnett, Tarbet, and Co.) attended on behalf of the Gas Company.

Mr. RUDD explained that on the 8th of April a party of the Gas Company's men took up the flagging of the footway facing a house near plaintiff's, for the purpose of laying a gas-pipe into the house; and the work was left in an unfinished state until the Tuesday following. On the preceding day, about half-past nine, when Mrs. Braley was returning home, at the point where the pavement had been disturbed, she struck her foot against the elevated edge of a flag-stone which had been carelessly replaced, lost her balance, and fell heavily, injuring her face and arm, and sustaining a severe shock, through which she was confined to the house under medical care for several weeks. On his (Mr. Rudd's) applying on her behalf to the Gas Company for compensation, he was referred to the Corporation as being the authority responsible; and by the Corporation he was referred back to the Gas Company. Consequently, he had no alternative but to sue both parties, so as to ascertain where the liability really lay.

The plaintiff and several of her neighbours having given evidence as to the accident, and its cause and consequences,

Mr. RIGBY SWIFT submitted that there was no evidence against the Corporation. He maintained that, by the provisions of the Gas-Works Clauses Act, the Gas Company were primarily responsible to the public in regard to street repairs, restorations, &c., after disturbance caused by or for them; and though, as a matter of mutual convenience, the Corporation had for many years undertaken the work of restoration, it was as contractors and not as principals. Therefore they could not, in any case, be held responsible until they had received notice of the work to be done, and had actually taken charge of it. In this case, they did not receive such notice until the afternoon of Saturday, April 10; and the Monday following being a Bank Holiday, the Corporation's share of the work did not commence until the Tuesday morning, before which time the accident occurred. The Corporation, therefore, could not be held responsible; and the onus of guarding or protecting the public in the interval rested with the Company.

Mr. MAXWELL submitted that the Company finished their work on the 8th of April, and sent notice of the fact to the Corporation department, which was the only onus resting upon them.

His HONOUR said there was no question that the plaintiff had met with an accident, for which she was entitled to compensation from somebody; and, the damages having been agreed at £7 7s., he gave judgment for the plaintiff for this amount—the question as to which defendant was liable being left for further argument and evidence.

The parties having been heard,

His HONOUR said it was unreasonable to suppose that the Corporation could at all times and seasons undertake any amount of work and relieve their principals of all risk. He thought they had acted reasonably and properly in the case, and were not to blame. His judgment would, therefore, be against the Gas Company for the amount at which the damages had been agreed.

Mr. RIGBY SWIFT applied for costs against the Company on the higher scale, on the ground that the case was one of great public interest and importance.

After considerable discussion on the point, his Honour declined to make any special order as to costs.

SEQUEL TO A GAS EXPLOSION.

Judge's Suggestion as to Medical Evidence.

At the Clerkenwell County Court, on Monday last week, before his Honour Judge Edge, an award under the Workmen's Compensation Act was applied for by William Pope, watchman, of Lillington Street, Pimlico; the respondents being the London County Council.

The applicant was in the employ of the Council as a watchman at the School of Art, Southampton Row; and on the 25th of October last, which was a Sunday, a man named Cullen, who was on duty as a watchman at the Council's School of Arts and Crafts in Queen Square, Bloomsbury, went to him in the morning and said there was a smell of gas at the school. The two men went together to the school, and opened the doors and windows; and Cullen turned off the gas at the meter. The applicant returned to Southampton Row, and some time later went again to the Queen Square school. He put his hand over the gasalier burners, and found there was a faint smell of gas. Thinking it was caused by waste gas in the pipe, he applied a light, considering this would give a clue to the place where the gas was passing through. The result was a violent explosion, and he received injuries on the face and hands. He was taken to the Italian Hospital in Queen Square, where he remained till the 23rd of November. Afterwards he went to St. George's Infirmary, Fulham, where he stayed till the 4th of March. He had not yet been able to do any work. The Council paid him half wages up till the 23rd of January.

Medical evidence having been given to the effect that the applicant was unable to do heavy manual work, and that it was doubtful if the joints of his right hand would ever be restored to their original condition, it was submitted by Mr. Glasgow, on behalf of the Council, that there was no case for them to answer. If the explosion had happened when the applicant first went to Queen Square, his going there at the time of an emergency would have been in his favour in the present claim. The doors and windows in the building were opened, and the smell of gas had passed off. Therefore, when the applicant returned three hours later, there was no emergency. The premises were then safe; and if he had not applied the light, there would have been no accident. Mr. Firminger, who appeared for the applicant, said it was, no doubt, an injudicious act; but the material question here was whether he did *bonâ fide* believe that what he was doing was helpful to his master.

Medical evidence was then given for the respondents to the effect that as far back as January last there was no reason why the applicant should not have used his hand; indeed, the use of a spade was the very thing that would have cured him.

In giving his decision, his Honour said he was not going to deal with the question of law as to whether at the time of the accident the applicant was acting in the course of his employment. The conclusion he had come to was that on the 15th of January the applicant was quite able to resume his work, and that he had then practically recovered from the effects of the accident. He (his Honour) was bound to say, though he did it with some reluctance, that no case had been made out, and that his award must be for respondents. In the course of giving judgment, his Honour remarked that, in cases where the question was purely one of medical evidence, it would be much better if, instead of bringing the matter before a Judge in Court, a rota of leading medical and surgical practitioners in London should be formed by the authority of the Home Secretary. Then, in cases of the sort he was now dealing with, the medical men on each side could agree upon some member of the rota, who should examine the patient in the presence of the medical men on both sides, and whose report to the Court should be taken as conclusive. He added that he was sure that much more satisfactory decisions would be given then than it was possible to arrive at now in cases where the question was purely one of medical evidence.

UNSUCCESSFUL ELECTRIC UNDERTAKING AT UXBRIDGE

The Official Receiver in the Companies Winding-Up Division of the High Court of Justice has issued particulars to the creditors of the Uxbridge and District Electric Supply Company, Limited, from which it appears that a statement of affairs has been filed showing gross liabilities amounting to £59,290, of which £6622 is due to unsecured creditors. The assets are estimated to be worth £75,039, from which have to be deducted the claims of preferential creditors for wages, &c., and those of the debenture-holders; the assets showing an estimated surplus of £15,748. As regards contributories, the paid-up capital is £26,275, and the assets consist of the above-mentioned surplus; so that the deficiency as regards shareholders is £10,527.

The report and observations of the Official Receiver are to the following effect: The winding-up order was made on June 29 last, on the petition of a creditor; and Mr. John Conacher, the General Manager of the Company and of the Metropolitan Electric Supply Company, Limited, was appointed Special Manager for the Official Receiver. The Company was registered on June 24, 1899, as the Uxbridge and District Development Syndicate, Limited, with a nominal capital of £1000, in shares of £5 each; the intention being to apply for a Provisional Order granting a monopoly for the supply of electricity in Uxbridge and the adjoining districts. The nominal capital of the Company was eventually increased to 10,000 ordinary and 5000 6 per cent. cumulative preference shares of £5 each; and 5255 ordinary shares, representing £26,275, have been allotted—the whole being subscribed for in cash except 45 shares issued as fully-paid. No preference shares have been issued. A Provisional Order was granted to the Company, under which they obtained power to supply electricity in Uxbridge and the immediate neighbourhood. The area of supply was afterwards extended by further Orders; and the name was changed to the Uxbridge and District Electric Supply Company, Limited. A prospectus was issued on May 20, 1901, offering 2650 £5 shares for public subscription; but only a small number (128) were applied for. The original shareholders received £1000 for waiving the right they claimed to convert their holdings into founders' shares; and the money was applied by them in taking up 200 further shares in the Company.

Under an agreement dated March 26, 1901, the General Electric Company (1900), Limited, agreed to make advances from time to time to the Company, not to exceed a total of £20,000, on the security of the debentures. The agreement provided that orders for the plant and works necessary for the Company's undertaking should be placed with the General Electric Company at rates equal to 10 per cent. above competition prices. In May, 1901, the Company acquired a freehold site at Uxbridge, a generating station was built and equipped, and the laying of mains proceeded with. The approximate length laid is 37½ miles of high-tension mains and 11½ miles of low-tension mains. The public supply of electricity commenced in May, 1902. By September, 1904, the General Electric Company had subscribed for a total of £20,000 of debentures, and a further £3900 was taken up by Directors and the public. The debentures carried interest at a minimum rate of 4 per cent., and were exchanged in September, 1904, for others bearing interest at 5 per cent. The Company at the same time issued debentures for £3000 to Callender's Cable and Construction Company, Limited, in payment of a debt. In May, 1905, the General Electric Company held debentures for £21,500 and 320 shares (£1600), and Callender's Company held debentures for £3000 and 730 shares (£3650). By an agreement of May 8, 1905, in consideration of the Company withdrawing their opposition to a Bill in Parliament, the Metropolitan Electric Supply Company, Limited, agreed, in the event of the Bill receiving the Royal Assent, to acquire the interest of the General Electric Company and Callender's Company, and to take up an additional 500 shares in the Company. The Metropolitan Company were also to have the right to nominate Directors up to four in number. The arrangement was duly carried out in December, 1905, and the Metropolitan Company have since taken up further debentures for £19,000, which were issued to them at a discount of 10 per cent. The total debentures issued by the Company

amounted to £50,000, of which £43,500 are held by the Metropolitan Company and £6500 by the Directors and the public. The total capital expenditure of the Company in connection with the undertaking, according to the accounts for the year 1908, was £81,358—being £7183 in excess of the share and debenture capital subscribed.

The Company have been unable to pay the interest due on debentures for the half year ending December, 1908, or to meet their other liabilities. On the presentation of the petition to wind up, the Metropolitan Company commenced an action, and on July 20 last the Court appointed an Official Receiver for the debenture-holders. The assets of the Company are valued in the statement of affairs at £63,038. The failure of the Company is attributed by the Directors to want of working capital, and to loss of business caused by closing-down customers' works.

TAMPERING WITH A PREPAYMENT GAS-METER.

At the Tottenham Police Court last Thursday, William Griffin was summoned for wilfully and fraudulently impairing an automatic gas-meter belonging to the Tottenham and Edmonton Gas Company. Mr. W. Windsor prosecuted; Mr. Kershaw appeared for the defendant. Sidney Griffiths, a collector in the employ of the Company, said he called at the defendant's house on the 9th of July, and collected 1s. 11d. from the meter, the index of which recorded the consumption of 5600 cubic feet, which was an increase of 1700 cubic feet since the previous reading. There should have been 5s. 6d. in the box. Herbert Thomas Smallbones, another collector, said he examined the meter on the 20th of August, and the reading was exactly the same as on the 9th of July. There was 3d. in the money-box. He spoke to Mrs. Griffin about this; but she made no remark. Frederick Lambert, a gas-fitter, said he inspected the meter at the defendant's house on the 1st of September. The reading then was 5100 cubic feet. He removed the meter to the stores to be tested. William Edward Barney, Inspector of Meters for the Middlesex County Council at the Angel Road testing-station, stated that on the 10th of September the meter came into his possession to be tested; and he found that it had been tampered with. It passed gas satisfactorily; but the index door-frame had been forced from the front of the meter sufficiently to allow the glass to be withdrawn. The index hands had been taken off their centres; such force being used in the operation as to crack the enamel dial. The hands had then been refixed in wrong positions, so that they contradicted each other. Transparent cement had been used to put them on again. It was usual to rivet them on. The glass and frame were afterwards put into their former positions with wax, and then repointed to correspond with the surrounding parts. It must have taken at least four hours to do this work. The extent of the damage was about 20s. In answer to Mr. Kershaw, witness said he did not think the meter could have been tampered with two or three times. Though set wrong, the index would still record; but it would not start from the right point. Alfred Whitchurch, in the employ of Messrs. Thomas Glover and Co., Limited, said he was present when the meter was tested, and agreed that it had been tampered with. He considered this had been done between July 9 and September 1. The witness Smallbones was recalled, and said that at the time of the tenancy of the previous occupier of the house the same meter was in use there, and worked in a perfectly regular manner. Mr. Kershaw, for the defence, contended that there was no proof that the meter was in proper condition when it was first used by the defendant. He called Griffin, who stated that when he went into the house there were other people on the top floor, and he believed that proceedings had to be taken to eject them. He denied that he had ever tampered with the meter. In answer to Mr. Windsor, he said his suggestion was that the tampering was done before he became the tenant. Mrs. Griffin, wife of defendant, said that on two occasions she complained to the Company's collector that she did not think she was getting sufficient gas for a penny. She had no knowledge of any interference with the meter. The Bench imposed a fine of 40s. and costs, or 21 days' imprisonment.

The Dangers of Geysers.

Last Tuesday, an inquest was held at Sheffield on Robert James Bennett, aged 50, a draughtsman, residing at Bolton, who died in the Sheffield Royal Hospital. While visiting at the house of a friend in Sheffield, he had a bath in a room in which there was a gas-heated geyser; and this was thought to have had something to do with his fatal illness. Dr. Robertson said his death was due to a peculiar kind of pneumonia, which was partly caused by coal-gas poisoning. The deceased also suffered from congestion of the brain and inflammation of the lungs. Mr. Arthur Mead said he had examined the geyser and found that on lighting it and leaving it for about two minutes the flames were extinguished. This might be occasioned either by the outlet-plug for the disused gas constituents being blocked up, or by a strong downward draught. The geyser was lighted by five bunsen burners. The products of combustion were meant to escape outside by means of a flue. To fill the bath, water had to be run through the geyser for about twenty minutes by means of a tube. If the burners were lighted and the water was flowing, carbon dioxide, the product of combustion, would escape through the flue if it were in order. If the burners were not alight, and the water were off, ordinary coal gas containing 7 per cent. of carbon monoxide, which was much more poisonous and deadly to life than carbon dioxide, could quickly fill the bath-room. On the other hand, providing the flames were touching the cold surface, there would be a certain amount of carbon monoxide generated; but he did not think it was in this case. It was not safe to use the geyser with the gas on and the water off, even now that a new and effective flue had been attached. A verdict of "Accidental death" was returned.

The officials of the Chichester Gas Company have found it necessary to caution the residents in the city against the hawkers of fittings in the Company's name. The fittings in question have been sold at a much higher price than that charged by the Company.

MISCELLANEOUS NEWS.

BRITISH GASLIGHT COMPANY, LIMITED.

Bad Trade and Gas Consumption—Righting an Income-Tax Error.

The Half-Yearly Meeting of this Company was held last Wednesday, at the London Offices, No. 11, George Yard, Lombard Street, E.C.—Mr. J. HORSLEY PALMER in the chair.

The SECRETARY (Mr. A. W. Brookes) read the notice convening the meeting, as well as the report of the Directors and the statement of the Norwich accounts. The report was as follows:

The Directors submit the half-yearly accounts of the Company to June 30 last, as examined and certified by the Auditors, who have also vouched for the correctness of the several investments held by the Company.

The available profit is £23,444 11s. 5d., after deducting [omitting shillings and pence] the following sums: Income-tax, £2012; Hull debenture interest £2128; Norwich debenture interest, £1773; Potteries debenture interest, £662; Trowbridge debenture interest, £165; and interest on debenture stock, £2270—total, £9013.

HULL.—The gas-rental shows an increase of £644, as compared with that of the corresponding period of 1908; the price of gas having been the same—viz., 2s. per 1000 cubic feet. Coke shows a decrease of £991; tar and tar distilling, of £67; ammoniacal liquor and sulphate of ammonia, of £512. Coals have cost 13s. 1d. per ton, as against 14s. 6d. Coke has realized 10s. 8d. per ton, as against 12s. 6d.

The gas sold was 633,910,981 cubic feet, against 629,005,291 cubic feet in the corresponding period of 1908—an increase of 4,905,690 cubic feet, or equal to 0·78 per cent. Of this quantity 44,657,000 cubic feet were supplied in bulk to the Corporation for the supply of the Old Town.

The profit realized is £2651 in excess of the parliamentary interest. This sum has been invested, making the reserve fund £37,105.

NORWICH.—The gas-rental shows a decrease of £4824, as compared with that of the corresponding period of 1908, owing chiefly to a reduction in the price of gas from 3s. 3d. to 3s. per 1000 cubic feet from Jan. 1 last. Coke shows a decrease of £368; and tar and ammoniacal liquor, an increase of £33. Coals have cost 17s. 1d. per ton, against 18s. 9d. Coke has realized 14s. 10d. per ton, against 16s. 5d.

The gas sold was 252,834,400 cubic feet, as against 264,538,000 cubic feet—a decrease of 11,703,600 cubic feet, or equal to 4·42 per cent.

The profit realized, after writing off £3482, the balance of cost of reconstruction of works, is £5260 less than the parliamentary interest.

POTTERIES.—The gas-rental shows a decrease of £554, as compared with that of the corresponding period of 1908; the price of gas having been the same—viz., 2s. 6d. per 1000 cubic feet. Coke shows a decrease of £531; tar, of £626; and ammoniacal liquor and sulphate of ammonia, of £184. Coals have cost 10s. 9d. per ton, as against 11s. 2d. Coke has realized 8s. 7d., as against 8s. 8d. per ton.

The gas sold was 186,733,778 cubic feet, as against 191,379,855 cubic feet—a decrease of 4,646,077 cubic feet, or equal to 2·42 per cent.

The profit realized, after writing off £2000 on account of buildings and plant thrown out of use and £2000 part cost of levelling new land and making drains and roads, is £1332 less than the parliamentary interest. This sum will be taken from the reserve fund; leaving a balance of £3235 to the credit of that account.

TROWBRIDGE.—The gas-rental shows an increase of £175, as compared with that of the corresponding period of 1908; the price of gas having been the same—viz., 3s. per 1000 cubic feet, with discounts. Residual products show a decrease of £139. Coals have cost 16s. 11d. per ton, against 16s. 6d. Coke has realized 13s. 2d., against 13s. 4d. per ton.

The gas sold was 33,688,488 cubic feet, against 33,175,376 cubic feet—an increase of 513,112 cubic feet, or equal to 1·54 per cent.

The profit realized is £463 less than the parliamentary interest.

HOLYWELL.—The gas-rental shows an increase of £79, and residual products a decrease of £7. The profit realized is £223.

FINANCIAL RESULT.—The available profit, added to the previous balance of profit and loss, amounts to £78,211. From this sum, the Directors recommend a dividend at the rate of 10 per cent. per annum, free of income-tax. This will amount to £24,500, and leave a balance of £53,711.

The Directors who go out of office are Major-General William T. Corrie and Mr. Leonard R. Wilkinson; and the Auditors are Mr. E. Knowles Corrie and Mr. William Cash. They respectively offer themselves for re-election.

The CHAIRMAN, in moving the adoption of the report and accounts, said there were a good many points about which to speak, and there were some explanations to make. In the first place, the half-year's report was a little disappointing to the Directors, from the fact that the business had not gone ahead in the way they could have wished. He was not going to enter into a political speech with regard to the business of the country and trade generally; but there was no doubt that the Company had felt the effect of bad trade to a considerable extent, both at Hull and at the Potteries. At the latter station, there had been a decrease in the amount of gas consumed of 2½ per cent., and at Hull where the principal business was situated, there was an increase of only ¾ per cent. With regard to Norwich, there was an apparent alarming decrease of 4½ per cent.; but that he would explain more particularly when he came to the Norwich station. Then, with regard to the profits of the half year, it would be noticed that they had not quite earned the full dividend. This also was largely due to the bold step the Directors took at Norwich in reducing the price of gas from 3s. 3d. to 3s. But he did not think there was anything to be alarmed at in the fact that, in the half year, the full profit had not been quite made. The Board had every reliance that in the future the Company would still be doing a prosperous business at both Norwich and Hull, and they also wished to point out that they had a carry-forward this half year of £53,700; so that the Company were in a very good financial condition. To refer now to a few matters of interest with regard to the different stations. Concerning Hull, the Directors had, he believed for the first time in the history of the Company at that place, entered into a five years' contract for the public lighting of Hull. Hitherto they had gone on from year to year in the most amicable manner with the Corporation; but lately they had been called upon (and had done it with the greatest pleasure) to light a large number of what were called terraces in Hull, but which were really what would be called in London "blind alleys." These terraces had never been properly lighted,

because they did not come, in the old days, under the jurisdiction of the Corporation, but were private property. However, it was now felt that these terraces should be properly lighted; and so the Company came forward with a scheme, in conjunction with their neighbours the East Hull Gas Company, to light these terraces (of which there were a large number) at a very small cost. He might say that one of the Directors (Major-General Corrie) went down to Hull the previous week to attend a public function, at which there were present the Mayor and other members of the Corporation; and they expressed, in the highest terms, their gratitude to the Company for the liberal way in which they had treated the town in respect of this special lighting. Then they had their usual gas exhibition at Hull, and orders were taken for 443 cookers, and for a great many other fittings and appliances. His colleague (Mr. Corbet Woodall) attended, and said that it was a remarkably good show. Then at the last meeting he spoke to the shareholders about the very cramped condition of their offices in Baker Street, and mentioned that they had purchased the adjoining properties with the intention of adding to their workshops and also to the offices. These changes were not yet completed. The tenders, however, were out; and it was found that it would cost about £4000 to erect the buildings. But they would be a great benefit to the Company when the work was done. To refer to a small matter that had taken place since the close of the half year, he had no doubt that some of those who read the "GAS JOURNAL" had seen the interesting account of the visit of the Eastern Counties Gas Managers' Association to Hull, in connection with which Association their Engineer at Hull was the President this year; and therefore, on the occasion of the meeting, the Company entertained the visitors and many of the public men of Hull at luncheon. With reference to Norwich, the decrease in the gas-rental had been mentioned in the report—viz., £4824. This was mainly owing to the reduction of 3d. per 1000 cubic feet in the price of gas. Approximately the 3d. came to a little over £3000. Then a year ago there was an old method in vogue of reading the meters, which did not commend itself to the Company's Manager in that City; and so a method of reading was instituted by which the meters were taken at exactly, or, as near as possible, exactly with, the half year. As a result, this half year they had an apparent exceptional loss. It was not really a loss, but was less profit in the half year, amounting to about £1800. In this way, the decrease of £4800 was fully accounted for. On the other hand, he should like to point out that the Directors had now finished the writing off of all the constructional work that had taken a great many years to do. The shareholders knew the Company had had a large suspense account there. The Directors had gradually, half year by half year, been writing it down; and now, on this occasion the balance of the cost of the reconstruction had been written off. As this was no less a sum than £3482, he hoped that in the near future they would come in for more of their authorized earnings. During the half year they had, with the approval of the Board of Trade, brought into use the "Metropolitan" No. 2 burner, which, of course, would be of considerable advantage to the Company, and would regularize the testing under modern conditions as had been done in the case of other companies. In prospect was the early construction of a new gas tank and holder at Norwich. There was a suitable site on the scheduled land; so that they did not anticipate any difficulty with regard to the public in that respect. It was hoped that the new tank and holder would be erected next year. It would be absolutely necessary because the business was increasing there; and it was hoped with the reduction in the price of gas, if trade revived, they would have a considerable increase in the amount of gas supplied in Norwich and the surrounding districts. He had no doubt that some of the shareholders had read in the papers that during the half year (on June 18), the Company had the honour of giving a handsome entertainment to the Institution of Gas Engineers, who made an excursion to Norwich on the occasion of their annual meeting in London, their respected Manager at Norwich being the President of the Institution at the time. He (the Chairman) was exceedingly glad to be able to report that everything went off very well, and not only did the Corporation join with the Company in most heartily welcoming the Institution, but they provided part of the entertainment by a trip on the Norfolk Broads. Concerning the Potteries, he had very little to report, except to say how very bad trade was there; and this had been particularly felt by the Company. He had been looking back for a few half years; and it was wonderful how well they had maintained the business at the Potteries. He had no doubt Mr. Corbet Woodall would bear him out when he said that it had been a source of wonderment to him who knew the district so thoroughly, and who was so very much interested in the place, that the gas business had done so well as it had. Though they were now feeling the effects of the bad trade at the Potteries, he (the Chairman) sincerely hoped that the trade of the district would recover, and that the Company would go ahead there as formerly. He heartily trusted it would be so, because the Company had been going to great expense in building new works and putting up new gasholders to meet the wants of the large and extensive area which they lighted. There was another matter to which he wished to allude, and of which notice had been sent to the shareholders. It was with reference to the income-tax on the Directors' and Auditors' remuneration. It was a matter which he thought required adjustment, and which the Directors felt must be laid before the shareholders in order that it might be set right. It had been an absolute rule in the Company from time immemorial to pay the shareholders their dividends free of income-tax. That was within the province, and rightly so, of the Directors to decide; and it had also been from time immemorial the custom to pay, clear of income-tax, the salaries of the officers and staff and the remuneration of the Directors and Auditors. In this case, he felt the Directors had been in error. In looking into this matter so far as the Directors and Auditors were concerned, it was found the resolutions passed by the proprietors had never stated that the remuneration was to be paid free of income-tax; so that technically they had been doing something they ought not to have done without the authority of the shareholders. The moment the Directors' attention was drawn to the state of things, they thought the only thing to be done was to leave the matter in the shareholders' hands, and ask them to pass a resolution giving the absolution that would put them straight. A resolution dealing with it was in the hands of one of the shareholders. Then there was the question of the Auditors. It would be remembered that, within the year with which they were dealing, after the last election of Directors and Auditors took place, they lost one of the Auditors. By the Company's statutes, the Board were empowered to appoint a gentleman as Auditor temporarily; and the gentleman appointed was Mr. William Cash, the well-known Accountant in the City, whose whole business life had been devoted to accounts, and more particularly to gas accounts. Speaking personally—not as Chairman, but as an individual—he thought no better solution of the position in which they were placed could possibly have been made. Mr. Cash had audited the present accounts; and the Secretary reported that a most searching investigation was made of the accounts before Mr. Cash passed them. He (the Chairman hoped and trusted the shareholders would re-elect Mr. Cash.

Mr. F. WILKIN seconded the motion; and it was unanimously carried.

Moved by the CHAIRMAN, and seconded by Mr. F. WILKIN, a dividend was declared at the rate of 20s. per share for the half year, clear of income-tax.

Mr. L. R. ABBEY-WILLIAMS said, as to the remarks of the Chairman about the payment of income-tax on the remuneration of Directors and Auditors, he had a resolution to propose which he thought would, in the words of the Chairman, give absolution for the past, and protection for the future. He remembered that not long ago he was reading over the half-yearly report of a well-known Gas Company on the south coast, and the same thing he found had happened there. The authorization had been entirely omitted; and, at the first half-yearly meeting after the matter was discovered, the shareholders passed a resolution regularizing the matter. The resolution he had to propose was—

That all payments of income-tax in respect of the remuneration of Directors and Auditors heretofore made by the Board out of the funds of the Company be, and the same are hereby, confirmed and approved; and that the Board be, and they are hereby, authorized to pay out of the Company's funds as additional remuneration all income-tax assessable on any remuneration henceforth payable to any Director or Auditor.

Mr. A. G. BURNEY seconded the motion, remarking that he knew of a precisely similar case to this occurring in another Company carrying on business in the City. This happened only a short time ago; and the Directors in that instance adopted precisely the same course as was being followed now.

The resolution was unanimously carried.

The CHAIRMAN, on behalf of himself and his colleagues, thanked the shareholders for the kind way in which they had rectified the errors of the past, and had granted the Directors the rights in this matter for the future.

Moved by the CHAIRMAN and seconded by Mr. WILKIN, Major-General Corrie was re-elected to his seat on the Board; and on the proposition of Mr. CORBET WOODALL, seconded by Mr. R. S. GARDINER, Mr. Leonard R. Wilkinson was also returned to his seat.

Moved by Mr. BERNARD F. HARRIS, and seconded by Mr. KENNETH R. MACKAY, Mr. E. Knowles Corrie was re-elected an Auditor, as was also Mr. Cash, on the motion of Mr. MACKAY, seconded by Mr. WILLIAM HILL.

Mr. CASH, in replying for himself and colleague, remarked that he should like to say on this first occasion of addressing the shareholders, that he had found the books of the Company excellently kept, and everything in first-class order; and he was sure the shareholders, who had already every confidence in the Directors, must feel gratified that the whole of the financial affairs of the Company were in such a sound position. He had had an opportunity of calling at Hull, and he had found there that, throughout, the accountancy side of the station was excellent.

A vote of thanks was passed to the Chairman and Directors, on the motion of Mr. A. G. BURNEY, seconded by Mr. CASH.

The CHAIRMAN, in responding, said it was very satisfactory to have this testimony as to the manner in which their books were kept from such an authority as Mr. Cash.

Mr. CORBET WOODALL proposed a vote of thanks to the Secretary, Engineers, and staffs generally in London and at the stations. He remarked that what Mr. Cash had said with regard to the Secretary was sufficient. Mr. Brookes had been their Secretary now some twelve months; and on the Directors' side of the table, there had already been formed a completely satisfactory view of Mr. Brookes' services in that capacity. With regard to the business at the stations, they were coming to look upon the British Gas Company as a sort of training school for Presidents. They had already supplied from Norwich a President for the great Institution of Gas Engineers; and now they had the Eastern Counties Gas Managers' Association going to Hull for their President in the current year. In these two Presidents the Company had two worthy men; the one had already satisfied in every particular, and the other would do the same, those who had given them their confidence. If it were possible to take exception to a word in the Chairman's address, it would be, on his (Mr. Woodall's) part, to the use of the term "disappointing" with reference to the trading of the half year. Personally, he did not think they had any reason to be disappointed with it. They might regret that the trade of the country was not so good as it was; but the results of the Company's working he thought were, in the circumstances of the times, most gratifying. With reference to the reduction of the balance carried forward, the Chairman had explained this; and they could not expect, and did not wish, that they should always go on piling up still further the large carry-over that had been accumulated. It had been accumulated expressly to provide for reductions in the price of gas, and to equalize dividends during the time the reductions were recouping themselves by increasing the demand for gas. He referred to this because he was sure the officers at the stations were doing their very utmost to maintain the business of the Company.

Mr. R. S. GARDINER seconded the motion, which was cordially passed.

The SECRETARY, on behalf of himself and all his fellow-officers, thanked the Chairman, Directors, and shareholders for their kind expressions of confidence. He added that it would be very gratifying to all the secretarial and book-keeping staff to learn the words of praise that had fallen from the lips of Mr. Cash.

This terminated the proceedings.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

The Half-Yearly General Meeting of this Company was held at the Offices, D'Olier Street, Dublin, last Thursday—Mr. W. F. COTTON, D.L., J.P., in the chair.

The SECRETARY AND MANAGER (Mr. F. T. Cotton) read the notice convening the meeting, and the report of the Directors for the six months ending the 30th of June, given in the "JOURNAL" last week (p. 846), with the accounts for this period, was presented.

The CHAIRMAN, in moving the adoption of the report, said that during the half year there had been expended on capital account £10,536. About half of this sum was spent on meters, stoves, and fittings, principally for the prepayment system; the balance being for new mains and services. On referring to the accounts, it would be found that the income from all sources amounted to £153,656; and the gross expenditure was £114,990—leaving a net profit of £38,666. From this sum, interest on the debenture stock and overdrafts from the bankers had been deducted; leaving a balance of £32,322. In order to pay the same dividend as last year, it would be necessary to have recourse to the reserve fund, and draw therefrom £4034; leaving to the credit of the fund a sum of £39,936. They had used up all the coals purchased at high prices at a time when they were threatened with strikes from all the quarters from which they drew their supplies. However, he was happy to say that coals had come down to very nearly their normal figure. Owing to the general depreciation in trade, there had been a falling off in the receipts for gas compared with the corresponding period of last year. The returns from coke were also somewhat less in consequence of having to dispose of it at a reduced price. In the half year under review, there had been put in 2179 new installations, in each case fitted with cooker, brackets, and pendant, as required. There were also 82 cookers supplied without house fittings, 467 cookers and 168 heating-stoves lent on hire, and 12 cookers and 104 heating-stoves and gas-fires purchased by consumers. The total number of cookers in operation was 81,007; heating stoves on hire, 1485; and 3446 stoves and gas-fires purchased by consumers. On previous occasions, he had referred to the retort-houses in course of construction at the Brunswick Street works. One of the sections was completed, and they expected that by the end of the year the second section would be ready for use. In these houses the modern system of carbonization had been introduced, by which there would be a great saving in coals and coke, and the yield of gas per ton of coal carbonized would be much augmented compared with the present production. He might say he was quite confident that when these new works were brought fully into operation they would be of great advantage to the Company. At the last meeting, he referred to the Bill being promoted in Parliament affecting the supply of gas to the city and out-townships. It passed through the House of Lords without material alteration; but subsequently, when it reached the House of Commons, petitions against its passing into law were lodged by the Corporation of Dublin and some of the townships. In order to avoid costly litigation, and with every desire to meet all opposition in a friendly spirit, the Directors obtained interviews with the members of the Corporation who had charge of the Bill. After these, with one or two exceptions, an arrangement was practically come to. The disputed points were ultimately settled during the Committee stage of the Bill in the House of Commons; and finally clauses carrying out the terms agreed upon were embodied in the Bill, which received the Royal Assent on the 16th of August, and was now an Act of Parliament. The Directors considered it unnecessary on the present occasion to enter into minute details of the Act. There were, however, one or two provisions to which he might call attention, such as the change from 16 to 14 candle gas, to be supplied under the modern mode of testing, at reduced prices, and to come into operation from January next; also the consolidation and conversion of the ordinary share capital into stock, which would make it more convenient for those who were interested in the Company.

Mr. CHARLES LAWLER, J.P., seconded the motion; and it was carried.

The dividends recommended were then declared; and a formal resolution was passed confirming the increase in salary granted to the Secretary and Manager at the preceding meeting.

Mr. MICHAEL MURRAY proposed that a vote of thanks be given to the Chairman, Directors, and officers, for the manner in which they had conducted the affairs of the Company during the half year. He said the vote was very well deserved, for the Company had gone through a very troublesome time. They had to face two or three things of which, perhaps, the general public were not aware. One was that they had to pay 1d. in the pound for losses on the opposition concern—he meant the electric light industry—inasmuch as when they paid £9000 a year in rates it was a serious thing to pay the extra 1d. Then the Insurance Companies wanted to make them responsible for a fire; but the officers were to be congratulated on getting a unanimous verdict at the trial. The third trouble was the Bill, which was got through in a wonderful manner.

Mr. A. REID seconded the motion; and it was carried.

The CHAIRMAN, in acknowledgment, said no body of men could be more careful, or devote more time and energy to the Company, than did the Directors; and he could say the same in regard to the officials.

Mr. F. T. COTTON also replied; and the meeting concluded.

Treatment of Sufferers from Carbon Monoxide Poisoning.—At an inquest held on Monday last week on John Hough, aged 35, employed at the Crewe railway works, it was stated that the man had been asphyxiated by inhaling carbon monoxide fumes while firing a gas-producer. Dr. Lawrence stated that the only real remedy in these cases was a withdrawal of the blood and the injection of fresh blood; and that artificial respiration, which had been tried, was useless, since the body became paralyzed, and would not take oxygen. The Coroner suggested that in future notices should be posted about the works that if ever another case occurred the victim should at once be removed to the hospital, and that no time should be wasted in trying artificial respiration.

SOUTH AUSTRALIAN GAS COMPANY.

In moving the adoption of the report of this Company for the year ended the 30th of June, noticed in the "JOURNAL" last week, at the recent annual general meeting, the Chairman (Mr. A. M. Simpson) remarked that the expenditure had been considerably in excess of that of the previous year. This, however, was made up by increased receipts. The sales of gas and residuals exceeded those of 1907-8 by £14,576, and those of 1906-7 by £26,340; so that the proprietors would see that there had been a steady increase of more than 10 per cent. in the past two years. Good progress had been made with the new plant, and more had been found necessary in order to keep pace with the growing business. During the year, 18 miles of main had been laid, and upwards of 1000 new meters fixed. In order to provide the necessary capital for the various works, £17,600 worth of bonds had been issued. Increased business had been done by the fitting department; and the cooking demonstrations had been well attended. As the result of the business done, they had paid the usual dividend, placed £12,500 to the reserve fund, and carried forward £800 or £900 more than they started the year with. The motion having been seconded, Mr. W. H. Phillipps said the Directors had steered through the difficulties attendant on a higher price of coal, and an increased cost of labour, in a most satisfactory manner. The shareholders expressed their perfect confidence in the Directors' management of the Company. The motion was carried.

PROFIT-SHARING AT CHESTER.

Annual Report.

At the Recent Annual Meeting of profit-sharing employees of the Chester United Gaslight Company—which was presided over by the Chairman, Mr. J. G. Frost—the following report of the Committee was submitted.

The total bonus added during the year is £297; and in addition £19 interest has been allowed. Sums have been deposited amounting to £77; and £156 has been withdrawn. But the greater portion of this has been paid to workmen leaving the Company's service and to representatives of deceased employees. The stock purchased by profit-sharers during the year has been £340, at a cost of £382; and the aggregate amount of stock transferred to employees under the scheme since its introduction in 1901 is £740. This is in addition to the balances amounting to £778 standing to the credit of employees. The Trustees have been fortunate in buying stock during the year which will enable them to transfer profit-shares at the same price as before—viz., £11 5s. for each £10 of stock, free of all expenses of transfer deed—and the Committee strongly recommend all their fellow employees to take advantage of the opportunity thus afforded to purchase stock. During the year, the principle of co-partnership has been adopted by a large number of other gas undertakings and large industrial concerns in various parts of the country. This is undoubtedly owing to the success achieved by the pioneers of co-partnership; and we may honourably pride ourselves on being connected with one of these. The bonuses accumulated under our profit-sharing rules have in some cases of illness been of great assistance; while the considerate efforts made by the employees to relieve the anxiety and suffering of ailing workmen have been frequent and liberal, and the development of such good-will and brotherly feeling can only be secured by following the true spirit of co-partnership.

The CHAIRMAN, in proposing the adoption of the report and accounts, heartily congratulated the men on the really substantial amount of their financial interest in the Company, and the large number who were now shareholders and registered in the books. The report was a very good one, and very encouraging. As Chairman of the Company, he took a keen interest in all the minor matters connected with the management, and particularly in those which affected the welfare of the employees, from the man or boy in the humblest position right along to the chief officials. It was most gratifying to the Directors and himself to see the large success achieved by the co-partnership scheme in so short a time. In a small concern like theirs, they were in the proud position of being able to show that there was an amount equivalent in cash to £1592 standing in their names in the books of the Company; and those who were young had thus, by this scheme, a golden opportunity of laying up a substantial provision against adversity or old age. Nor did its beneficial effect end there. Human nature was so formed that effort, and effort only, could develop and improve the possibilities which lay in all. Of course, all were not alike; but if each individual made the personal effort in his individual post to do his work thoroughly, it was quite certain that, in addition to assisting in the success of the concern, he must also be a better man. Speaking a special word of advice to the younger men and boys, the Chairman said the temptations to enjoyment and self-indulgence were never so great as to-day; and he would impress three things upon them. First, that it was only by a little self-denial that they could improve their prospects in life, and he urged them to devote some time—if only one or two nights a week—to self-improvement. There were many opportunities for them to do this. Secondly, let them fight their hardest to keep absolutely and always straight, and not to allow deception in any form to influence them for a moment. They might for a time seem to get along better; but it was fatal to their development as men, and in the long run could not cause anything but sorrow and trouble to themselves and those around them. Thirdly, let them not undervalue the use of money. Let them never allow themselves to attend amusements or form habits which they could not afford; but let them take care of what they had, so that they could hold up their heads, and feel they could pay their way—and perhaps help another not so fortunately placed. Let the spirit of hard, honest effort to help the less fortunate, and the exercise of that temperance which checked extravagance, not only in drink, but in all the temptations of life, be their really constant aim; and certain it would be the present report would be only the forerunner of many to follow, showing continued success. In addition, they must certainly

feel that they grew stronger, and were of more assistance to their fellows; and they would be unwittingly doing their duty to their country and bearing their part in aiding its progress.

Mr. J. R. MACHIN seconded, and referred to the doubts which were expressed when the scheme was started. He said these had all been falsified, and the scheme was of great benefit to them, not only financially, but in a variety of other ways. Their social club room was the outcome of the scheme; and it had established a social feeling among the men which all had enjoyed and benefited by. The scheme had been a good thing for one and all of them.

The motion was heartily carried.

Mr. F. A. PYE (the Secretary and General Manager of the Company) proposed a vote of thanks to the Chairman, referring to the interest displayed in the scheme by Mr. Frost and the other Directors, and also to the spirit of self-dependence which had been shown by the men in furnishing their club room—a spirit which the scheme had done much to foster and encourage.

Mr. J. C. BELTON (the Engineer) seconded, and urged the younger men to efforts at self-improvement; reminding them that to-day there were facilities by which any young man of intelligence could acquire a thorough and efficient knowledge of almost any branch of practical work. There was now every inducement offered to young men to improve themselves.

The CHAIRMAN briefly replied, and the meeting concluded.

MANCHESTER CORPORATION GAS UNDERTAKING.

Criticism by the Ratepayers' Association.

At the Annual Meeting of the Manchester Ratepayers' Association last Wednesday, Mr. J. C. B. Percy, who is in business as a printer, indulged in an exhaustive criticism of the management of the Corporation gas undertaking. Having stated that during the last ten years the illuminating power of the gas had been lowered by 20 per cent., the capital and loans largely increased, the net profit decreased, and the reserve fund of £147,000 wiped out, while the average selling price remained the same, the speaker proceeded to make a comparison between the gas undertakings of Manchester and Birmingham. He stated that not only was the average selling price of gas in Birmingham lower than in Manchester, but the total management expenses were £9784, compared with £22,659. Though there was 25 per cent. less turnover, collectors' salaries in Manchester totalled to £11,924, against £1506 in Birmingham. From these figures Mr. Percy argued that there was extravagance in management at Manchester; and he challenged the statement of the Gas Committee, contained in the last report, that the gas undertaking was "never in a better condition." He said that the poor illumination of an elementary school which he visited recently—a result of the lower quality of the gas now supplied—was quite sufficient to call for all the strictures which had been made upon it in the recent report of the Education Committee.

THE PROPOSED NEW GAS-WORKS FOR BELFAST.

Question of Site—Ormeau Park Rejected.

The Adjourned Special Meeting of the Belfast County Borough Council, to consider the minutes of the Gas Committee relative to the selection of a site for the new gas-works, was held last Tuesday, and occupied the Council from eleven in the morning till nearly seven in the evening, with an interval of two hours. As previously mentioned in the "JOURNAL," six sites had been submitted by the Gas Committee for the consideration of the Council—viz., Ormeau Park, Ormeau Park and Glentoran, Donegall Road, Oranmore, Twin Island, and Brick-Works. At the meeting of the Council on the 23rd ult., the Chairman of the Gas Committee (Mr. Doran), in a long speech, moved the reception of the Committee's minutes. To this motion, an amendment was proposed by the High Sheriff (Mr. F. Curley, J.P.) to adjourn the meeting until the 7th of October, and that in the meantime arrangements should be made for the Surveyor or some of his staff to point out to the members of the Corporation the various sites which had been considered by the Gas Committee. He subsequently, however, altered the date specified in his amendment to the 28th ult.; and this was agreed to. On the re-assembling of the Council, the Chairman of the Parks Committee (Mr. M'Clure) moved to omit the Ormeau Park site from the list submitted; and the motion was carried by 33 votes to 18. Subsequently, Mr. Riddell moved that the East Twin Island site should be selected; but the proposal was rejected by a small majority. In the result, the meeting was adjourned till yesterday.

Referring to the rejection of the Ormeau Park site, the "Belfast News Letter" last Wednesday made the following remarks: "We venture to say that the Council has seldom done a worse day's work. The decision thus come to is in direct conflict with all the advice which the Gas Committee, on behalf of the Municipality, has sought from those best fitted to give advice and counsel. We refer, of course, to the various experts who have been consulted on the matter. Five gentlemen have thus been called in at different times during the past seventeen years. Three of them—Mr. Foulis, Mr. Woodall, and Sir Alexander Binnie—are undeniable men, whose opinions on such a question are worth the whole weight of the combined wisdom of the City Council. Then there is Mr. Stelfox, the late Manager of the gas-works, and Mr. Sharpe, the present Manager. Each of these gentlemen, in addition to his professional repute, is intimately conversant with every requirement of the city in its gas supply and in the practical working out of the problems involved. Each of these experts has in turn recommended the Ormeau Park site as the site above all others upon which the extensions of the gas-works should be carried out. Yet, without going into the merits of the case yesterday, the City Council threw this site aside in the fashion we have stated, on the sole ground that it was part of the Ormeau Park, and the park must not be touched. This is sentiment run mad—nothing short of it."

DEVELOPMENT OF THE GAS INDUSTRY.

By ALEX. WILSON, M.Inst.C.E., Gas Engineer, Glasgow Corporation.

[From the "Glasgow Herald," Sept. 21.]

A considerable amount of surprise and incredulity is often expressed at the reported continued expansion and development of the departments and works for the supply of gas to large towns and cities, in view of the many competitors that are now in the field. Less than thirty years ago, gas consumed through flat-flame burners was the principal agent for illuminating purposes; candles and oil-lamps being practically the only other means available for obtaining artificial light. At the present time, the choice of an artificial illuminant is not so limited. Electricity, petroleum, acetylene, and many forms of oil and carburetted air gas are offered to the public; and many claims are made by their suppliers as to the efficiency and economy of these various illuminants.

SOME STRIKING STATISTICS.

The support given by the public to some of these systems of lighting must, without doubt, encroach materially on the business which at one time belonged almost exclusively to gas companies and the gas departments of corporations. Taking into consideration these encroachments, one need not wonder at the question being asked as to whether the demand for gas in large towns and cities is really increasing. The answer to this question can best be given by quoting a few statistics in relation to gas supply. Taking first figures relating to London and the English Provinces, we find the rate of expansion during the last twenty years to have been as under:—

	1888.		1908.
Total capital employed—			
Three London Companies	£14,224,223	..	£38,436,874
Twelve London Suburban Companies	2,397,255	..	7,032,600
Eight English Corporations	7,915,996	..	12,429,511
Eight English Companies	3,546,363	..	8,399,077
	£28,083,837	..	£66,298,062
Gross revenue—			
Three London Companies	£4,351,778	..	£6,781,953
Twelve London Suburban Companies	736,174	..	2,086,338
Eight English Corporations	1,808,984	..	3,337,625
Eight English Companies	976,582	..	1,943,637
	£7,873,518	..	£14,149,553
Number of consumers—			
Three London Companies	295,531	..	988,364
Twelve London Suburban Companies	61,503	..	357,382
Eight English Corporations	363,871	..	708,782
Eight English Companies	151,906	..	394,605
	872,811	..	2,449,133

The figures for the annual make of gas (in cubic feet) are—

	1888.		1908.
Three London Companies	26,494,173,000	..	39,903,684,000
Twelve London Suburban Companies	3,984,986,000	..	12,276,821,000
Eight English Corporations	13,525,797,000	..	24,752,186,000
Eight English Companies	7,343,333,000	..	14,810,572,000
Cubic feet	51,348,289,000	..	91,743,263,000

In the above figures, the same undertakings have, of course, been compared.

Gas lighting commenced in Glasgow in 1818; but there is no record of the quantity of gas manufactured until 1827, when meters were first used. In that year the gas made was a little more than 79 million cubic feet. Since the Corporation acquired the works and business of the Glasgow Gas Companies in 1869, reliable figures have been kept; and the following data have been extracted from the annual accounts of the Gas Department, the financial year of which ends on May 31:

	1870.		1890.		1900.		1909.
Expended on works and plant, less depreciation	£532,317	..	£637,132	..	£1,400,921	..	£2,410,366
Gross revenue	235,701	..	417,589	..	770,002	..	864,210
Price for lighting purposes, per 1000 cubic feet	4s. 7d.	..	2s. 6d.	..	2s. 2d.	..	2s.
Annual make, thousands of cubic feet	1,295,863	..	3,058,277	..	5,969,111	..	6,820,962
Number of consumers	93,349	..	134,215	..	201,878	..	269,322

During the last few years, competition for lighting business has grown much stronger; but the following table shows the continued development of the gas business in the United Kingdom for the period covered by the statistics published for the five years from 1904 to 1909:

	1904.		1909.
Number of undertakings	1,598	..	1,626
Annual make (thousands of cubic feet)	168,078,931	..	193,826,797
Number of consumers	4,630,568	..	6,134,739
Number of penny-in-slot meters in use	1,326,917	..	2,621,333
Number of cookers on hire	1,329,947	..	2,396,058

These statistics prove beyond doubt that the gas business, instead of being in a decadent state, is really in a strong and vigorous condition. This fact is fully appreciated and valued at its true worth by investors in gas shares; and their confidence is proved by the published market quotations for gas stocks.

INCANDESCENT LIGHTING.

Before dealing with the factors which are mainly responsible for the continued prosperity of gas undertakings, it is right to mention that, in addition to the encroachments of other illuminants, there is another very important cause tending to reduce the output of gas for lighting purposes. The invention of Welsbach has enabled the users of gas to obtain, by means of the incandescent mantle, greatly improved lighting

value from the same consumption of gas. This important result is arrived at by utilizing the heating properties of the gas by means of the bunsen burner to raise to a state of incandescence certain rare earths which are incorporated in the structure of the mantle.

In the flat-flame burners, which a few years ago were almost universally used, consumers rarely obtained more than 3 candles per cubic foot of gas consumed; and with old or unsuitable burners not more, and often less, than 2 candles per cubic foot, although high-quality gas of 20-candle power was supplied. With the cheap forms of incandescent burner, having ordinary upright mantles, it is now easy to obtain anything from 15 to 20 candles per cubic foot of gas used. By adopting the better makes of the improved inverted burners, specially suited for domestic and artistic lighting, from 20 to 25 candles per cubic foot are obtained; while with the high-power lamps, available for street lighting and the lighting of large areas, supplied with gas at increased pressure, from 50 to 60 candles per cubic foot is no uncommon return for the gas consumed.

Now that householders, shopkeepers, and others are recognizing the value and utility of this system of lighting—giving from six to twenty times the illuminating value compared with the old style of open-burner lighting—there need be little surprise if the quantity of gas used per consumer for lighting purposes is greatly reduced. This reduction is not, of course, to the full extent of the saving of gas that might be obtained under the modern conditions, as more light is now being required and used by all classes compared with what was accepted as sufficient (say) twenty years ago. Nevertheless, the saving of gas made by consumers, even when allowing for much superior illumination, amounts to a large quantity, and is computed to affect the total output of gas more than the encroachments of all other competing illuminants.

COMPETITION THE CAUSE OF DEVELOPMENT.

What, then, are the reasons for this continued expansion and development of the gas industry, in face of the encroachments of other illuminants and the reduced consumption of gas for lighting purposes? To go to the root of the matter, the real credit for the ever-increasing success of gas undertakings should be given to the rivalry between the various illuminants. That "competition is the life of trade" was never better exemplified than in the case of the gas industry.

Before the advent of electric lighting, the gas business, being practically a monopoly, was often conducted in an autocratic and unbusinesslike manner; customers being generally treated in the most off-hand way, and the "take it or leave it" principle being (and, may it be hinted, still is to some degree) the style of nearly all the officials of gas undertakings. As long as gas of fair quality was being supplied in sufficient quantity, the obligations of gas departments to their customers were supposed to be fulfilled. By stress of competition, more businesslike methods had to be adopted; gas officials were compelled to cultivate the *rôle* of tradesmen eager to do business; and to secure that business they had to study the needs and requirements of their customers in every possible way.

Those who appreciated the true position of affairs understood that the mere selling of gas should not be the sole aim and duty of the gas department; but to maintain the prosperity of their business it was absolutely necessary to advise and help the consumers to use gas for as many purposes as possible, and also, by putting forward the best appliances, enable them to extract the full lighting or heating value from the gas supplied. The public were encouraged to apply to the gas department in all cases of doubt or difficulty in connection with the gas service; and every man in the employment of the department who came in contact with the public was instructed and educated to assist them as far as possible, or direct them as to where they could obtain the information or advice required.

VALUE OF THE INCANDESCENT SYSTEM.

The factor which has been of the greatest service to the gas industry is undoubtedly the valuable invention by Welsbach, of which notice has already been taken. It has caused quite a revolution in gas lighting methods, and placed the use of gas as an illuminant in such a strong position, both as regards efficiency and economy, that it will be difficult for any of its competitors to dislodge it. It has enabled gas to meet the demands for better illumination, while at the same time greatly reducing the cost. With inverted burners suitable for all kinds of home and shop lighting, a light of 20-candle power can now be obtained for 40 hours at the cost of 1d.; and lights of higher candle power at equally low proportionate rates. The illumination given is clear, soft, and perfectly steady—an ideal light either to work or read by. In consequence of the comparatively small quantity of gas used, the amount of heat given off is greatly reduced; and the gas being consumed through the bunsen or atmospheric burner ensures perfect combustion. The growing volume of scientific evidence also shows that the old bogey of the unhealthfulness of gas lighting has now no foundation in fact.

There is also an important advantage with this system of lighting, having a bearing on the price of gas, in that gas of high candle power is no longer a necessity; in fact, gas of lower candle power is preferable for use in incandescent burners. No doubt, while the system reduces the consumption of gas per consumer, it has enabled the gas authorities to strengthen their hold on all kinds of lighting business.

ADVANTAGES OF GAS-COOKERS.

Another factor which has been of immense advantage to the gas authorities as well as to all classes of the community is the adoption of gas appliances for cooking purposes. The advantage to the gas department is that it provides a class of consumption which is not only extensive and growing larger every day, but occurs at a time when much of the plant and many of the staff of the department would be otherwise idle, or at least not fully employed. This means that gas for this service can be manufactured practically without entailing any extra cost for capital or other standing charges; and consequently customers who use gas for cooking purposes are entitled to special consideration from the department, because, the cost of the gas being really only the manufacturing charges, the difference between this cost and the selling price is clear profit.

The development of this outlet for gas is going ahead steadily; but there is room for a large extension of this business in Glasgow, when the number of stoves hired out by the department is compared with the figures of other large gas companies and corporations. The growth of the hiring out of cooking-stoves, which commenced in 1885 in Glasgow, is shown in the following table:—

	1885.	1895.	1905.	1909.
Stoves on hire . . .	431 ..	12,135 ..	28,044 ..	48,548

The advantages of the use of the gas-stove are so well known that it is scarcely necessary to enumerate them. The remark of the *chef* that "a gas-cooker cooks a dinner properly, but does not cook the cook," conveys a considerable amount of information; but, in addition to its efficiency as a cooking arrangement, the gas cooking-stove materially reduces domestic labour, and does away with most of the heavy, dirty, and hot work connected with cooking under ordinary conditions.

The advantages to the community, including both consumers and non-consumers of gas, as a result of this branch of a gas department's business, are important and far-reaching; but they do not receive the attention they deserve. It is generally admitted by all the smoke abatement authorities that the domestic chimney is by far the greatest sinner in the pollution of the atmosphere of large cities; and any measure which tends to a reduction of this evil assists very materially in improving the health of the people. If this fact were once fully recognized, the use of gas for domestic purposes would receive an immense impetus; the products of the combustion of gas being mainly carbonic acid and water, both innocuous products.

GAS FOR POWER AND MANUFACTURING PURPOSES.

Power gas forms a very important factor in the business of any gas department. The great improvements which have been made in recent years in gas-engines have enabled power users to obtain a better return for the gas used. With modern gas-engines, it is possible to obtain 1 B.H.P. per hour for a consumption of 14 or 15 cubic feet of gas. This means that in Glasgow fully 3 B.H.P. per hour can be had at the cost of 1d. There has been in recent years much competition for this class of business; but the low price of gas (now 1s. 8d. per 1000 cubic feet) and the reliable nature of this kind of power have enabled gas departments to maintain their output in this direction. The following are the figures relating to gas-engines, supplied with Glasgow gas:—

Year.	No. of Engines.	Horse Power.
1890	632 ..	No record.
1900	1,584 ..	7,383
1909	1,690 ..	19,003

Another field for the outlet of gas is its growing use for manufacturing purposes. Makers of gas appliances for industrial uses are now putting on the market a large number of heating arrangements, suitable for all kinds of work, which are meeting with much favour. Gas is one of the cleanliest of fuels, and by its use the exact temperatures required can be obtained with the utmost accuracy. With gas heating, certain classes of work can also be done in shorter time; and thereby a saving in wages and also better results are obtained.

In a manufacturing locality like Glasgow and the Clyde district, there is every prospect of a large development in this class of heating business. The following figures show the quantity of gas sold for manufacturing purposes in Glasgow for the last four years; the selling price for which has now been reduced to the power rate of 1s. 8d. per 1000 cubic feet:—

1906.	1907.	1908.	1909.
86,401,000 ..	166,009,000 ..	206,371,000 ..	222,756,000

PREPAYMENT METERS.

A new source of revenue has within recent years been found among a class of consumers with whom gas departments were afraid, or did not until recently think it worth while, to do business. In many of the smaller houses, the tenants were often quite unable to pay the deposit required; or, because of the uncertainty of their tenancy, they did not think it worth while to have the gas-pipes connected. Now, by means of the prepayment or penny-in-the-slot meter, gas is being supplied to this class of consumer, with advantage to the gas department, and is affording cheap and convenient light and heat to many a home. The gas is paid for on the ready-money principle; this preventing the running up of an account which usually had to be met at an inconvenient time, and the presentation of which was received by many of these householders with as much disfavour as any of the papers relating to rates or taxes.

That this class of business is getting to be an important one is shown by the following figures—showing (*a*) the number of consumers, and (*b*) the consumption of gas in thousands of cubic feet—relating to its development in Glasgow during the last five years:—

	1905.	1906.	1907.	1908.	1909.
(*a*) . .	721 ..	11,100 ..	27,177 ..	35,466 ..	43,900
(*b*) . .	— ..	40,908 ..	167,946 ..	262,826 ..	297,598

There are also in connection with the above at present over 10,000 small cooking stoves and grills lent, free of charge, as the extra price charged for the gas under this system allows this to be done with profit to the Gas Department.

In addition to the information given regarding the factors which demand the large quantity of gas supplied by the department, it may be of interest here to state that during the last financial year the coals carbonized amounted to 681,071 tons, costing £372,254; the quantity of coke sold was 280,116 tons, of a value amounting to £100,303; the worth of the tar and ammoniacal liquor sold was £119,654; while the total wages bill amounted to £229,323.

PROSPECTIVE DEVELOPMENTS.

Having discussed the question of the development of the gas industry in the past, it may be asked: "Are there in Glasgow any prospects of further developments in the demand for gas in the future in addition to the natural increase due to the expansion of the city and suburbs?" The answer to this question depends a good deal on how the Corporation manage and work the outside department of their gas business. The manufacture of gas in Glasgow is carried on with up-to-date plant and machinery; and the results show that the working costs compare favourably with the costs of manufacture in other large gas-works. There is therefore not much probability in the meantime of any great

reduction in these costs. Besides, the mere fact of reducing the price of gas 1d. per 1000 cubic feet (although in the total it means about £25,000 a year to the consumers) will not produce a large increase in the consumption.

If properly looked after, there ought to be, in addition to the gas used for lighting, further large increases in the demands for gas for power and manufacturing purposes; but there is also, when compared with other cities, a practically undeveloped field in connection with the gas used for household purposes, gas-fires and gas-heating appliances for all kinds of rooms, shops, and places of business, the heating of water for baths, lavatories, and culinary purposes, and the more extended use of gas-cookers. These all offer tempting prizes in the way of increased consumption to the Gas Department, and at the same time would provide a much improved service to the public. To obtain hold of this new consumption, the Gas Department requires to get more in touch with the consumers, and interest and educate them in the capabilities and advantages of gas for lighting, heating, &c.

Progressive gas companies who desire to maintain and increase their business have large and attractive show-rooms in all their principal districts, where consumers can obtain full information regarding the uses of gas, and see for themselves the various kinds of household and other appliances fitted up in working order; separate accommodation being provided for appliances for manufacturing purposes. In addition to this, some have a dwelling-house, furnished and fitted up in all its rooms with gas lighting and heating appliances, to illustrate the most improved methods of utilizing gas to the fullest advantage. Consumers are cordially invited to visit these show places, and they are also kept regularly informed regarding all new and improved appliances and methods of using gas.

IMPROVED PUBLIC LIGHTING IN CAMBERWELL.

The Camberwell Borough Council had before them last Wednesday an exhaustive report from the Works Committee with regard to street lighting. In February last, it was decided to request the South Metropolitan and South Suburban Gas Companies to reconsider their present terms for street lighting, and also to ask the Electric Lighting Companies on what terms they would be prepared to light the whole of the streets in the borough by electricity. Replies had been received from the various Companies named; but the Committee called attention to the fact that electric light mains were only laid in a small portion of the borough. The Secretary of the South Metropolitan Gas Company wrote on June 28 to the effect that, as a result of experiments with a new inverted burner, they were able to make a substantial reduction in their yearly charge—viz., to £2 19s. 6d. As the burner gave a light of 120 candles compared with 80 candles for the No. 4 burner, the reduction in the cost by its use would be considerable, especially as the charge for converting a lamp having the No. 4 burner to the inverted pattern was only 3s. By reason of the lower price for gas which came into operation at Midsummer, the charges for the No. 2 and No. 3 burner lamps would be reduced by 11d. and 1s. 3d. respectively—*i. e.*, to £2 8s. 3d., and £2 15s. 6d. If some of the No. 3 burners would be converted to the inverted type, the cost would be the same as in the case of the No. 4 burners.

By an arrangement with the Borough Engineer, the Company lit Shenley Road with the new inverted burner, and the Sub-Committee, having viewed the lighting, considered it a great improvement on the present system. They thereupon instructed the Engineer to negotiate with the Company as to the best terms they would offer for the conversion of the whole of the existing lamps to the new system. He had prepared a table showing that the net increase in illuminating power under the Company's proposals would be 59,940 candles; and the decrease in the cost, £113 7s. 11d. The cost of conversion, excluding the No. 2 burners, would be £216 3s. Mr. Talbot, the Company's Inspector of Lighting, attended a meeting of the Works Committee, and stated that the new inverted burner would take the place of the present No. 3 and No. 4 burners; and that the lighting capacity of the No. 3 burner, which was from 65 to 70 candle power, and the present No. 4 burner 80-candle power, would be increased by the new type of burner to 120-candle power. He also stated that the Company were at present experimenting with an inverted burner to take the place of the No. 2 burner, but that the trials had not yet been completed.

The Committee expressed the opinion that the terms offered by the Gas Company were very favourable, and that it would be an advantage to the borough if the new type of burner were substituted for all the present No. 3 and No. 4 burners; further, that it would not be advisable to wait for the burner which is suggested to take the place of the present No. 2, and that all the main roads at present lighted by No. 3 and No. 4 burners should have the advantage of the new type as early as possible. They were also informed by Mr. Talbot that it would be advantageous to substitute the new burner for the various special lights in use. The Committee were given to understand that the surrounding boroughs had had under consideration the question of the use of the new type of burner, and had come to the following decisions: Deptford, converting No. 3 and No. 4 burners in main roads, and side streets still under consideration. Lewisham, No. 4 Kerns to be changed as new lamps are fixed; Lambeth, converting No. 4 burners only; Southwark, under consideration; Woolwich, experimenting with 15 burners; Wandsworth, converting 12 No. 3 and No. 4 burners at street corners. It was resolved by the Council that all the present No. 3 and No. 4 burners in the area lighted by the South Metropolitan Gas Company be converted to the new type of inverted burner in accordance with the Company's letter of the 28th of June; also that the whole of the special lights be changed to the new type.

For breaking open a gas-meter and stealing 18s. 9d. from it, a single woman named Hannah Broadwith, who pleaded guilty, was recently sentenced by the Thirsk Magistrates to two months' imprisonment with hard labour.

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LIGHTING OF COMMON STAIRS IN EDINBURGH.

Proposed Adoption of Incandescent Gas.

The lighting of common stairs in Edinburgh, of which there are a great number, has for some years been a charge upon the rates. The subject was before the Edinburgh and Leith Gas Commissioners on Monday last week, in a report by Mr. W. R. Herring, the Engineer, in which it was stated that a letter had been received from the Town Clerk of Edinburgh, dated the 6th of September, referring to the experimental lighting of a number of common stairs in the city by the incandescent system, and stating that the Cleaning and Lighting Committee, with a view to converting the flat-flame burners in common stairs to incandescent, had directed the Inspector of Lighting to report on the experiment. They had also instructed him (the Town Clerk) to ask Mr. Herring whether he was in a position to formulate the Gas Commissioners' proposals in regard to the matter. This letter, Mr. Herring reported, was considered by the Commissioners at a meeting of the Works Committee on the 13th ult.; and, in accordance with their instructions, he submitted the following data for their consideration.

For the year ending the 15th of May last, there were in the common stairs of Edinburgh 12,635 jets, each burning 1½ cubic feet of gas per hour. A special burner has been devised that will enable the principle of incandescent gas lighting to be applied to this purpose, and the burner has now been subjected to practical use for more than twelve months. The cost of fitting the incandescent burner to the number of stairs indicated, including the burner and its parts, will amount to £3159, to which must be added the estimated sum of £686 to allow of the alteration of the piping in the stair where the upper jet is not now fixed on the top landing. The total estimated expenditure is therefore £3845. The burner in question is rated to burn 1 cubic foot of gas per hour, and will yield a light of from 16 to 17 candles as compared with the present measure of light. The cost of maintaining the present system of burners is borne by the Gas Commissioners, but is a negligible sum; the other charges being £2317 per annum, borne by the city authorities for the wages of the men who are employed to turn off the gas-taps at the times the burners are extinguished, and £420 charged against stair lighting account under the heading of "management"—the occupants of the stairs being authorized to light up the burners themselves. The gas bill for the present year's lighting, burning six months all night and six months until midnight, with gas at the rate of 2s. 8d. per 1000 cubic feet, will amount to £8232. The gas bill for the proposed method of lighting, burning all night, at the rate of 2s. 4d. per 1000 cubic feet, will amount to £5787; thus showing a saving of £2445 in the value of gas consumed.

The incandescent system of lighting will involve a heavier charge for maintenance, such as the renewal of mantles and glass globes, though, with regard to the latter, I have been experimenting with wire screens to protect the mantle, and am strongly impressed with their efficiency, and have based my estimate on their use, as I see no reason why screens instead of glass should not be employed throughout. Not only do they obstruct only a negligible quantity of light—some 2 per cent.—but the accumulating dust on the glass will necessitate their being cleaned; whereas the wire screen will require little, if any, cleaning in this respect. I estimate the annual cost for maintenance at £1163. This sum, therefore, deducted from the saving of £2445 in gas consumption, leaving a net amount of £1282, is the amount that will be actually saved, and necessarily available for the liquidation of the capital cost of the installation.

At the present time, the Commissioners are the only authority who are permitted to alter the pipes or fittings in the common stairs; and for this reason they should undertake the fitting-up of the stairs with the proposed incandescent system. In order to facilitate the conversion without imposing upon the Corporation any additional charge to what they at present pay, I have the following proposals to make: During the year ending the 15th of May last, the cost per jet for six months' all-night lighting and six months' lighting only to midnight, worked out at 17s. 4½d. per jet for all charges, including extinguishers' wages, gas, and £420 for management. Had the gas-jets burned all night, it would have amounted to £12,588, or 19s. 11d. per jet. It is proposed that the Corporation should continue to pay a sum of 17s. 6d. per jet for a period of three years for all-night lighting during the entire year, and that the Commissioners should undertake the installation and upkeep, including the extinguishing of the stair lights for at least this period, during which they will have nearly recouped the capital outlay involved in the original installation. At the end of this period, the terms should be subject to reconsideration, when I have no doubt that a substantial reduction per jet could be agreed upon, as, the capital cost having been liquidated, and the three-years' experience of the cost of maintenance and supervision being then fully known, a businesslike adjustment between the two authorities could be entered into. It is only right to point out that should it be necessary to increase the price of gas during this period the Corporation would stand to gain. On the other hand, I understand it is the Commissioners' wish, with regard to the stair lights as with the public lighting, to render the service without profit. In the event of the Corporation being desirous of retaining their present staff of extinguishers under their own control, which is represented by a charge of £2313, this sum, amounting to 3s. 8d. per jet, would fall to be deducted from the sum of 17s. 6d.; making the figure 13s. 10d. per jet for each incandescent burner. Substantial reasons could be urged for the staff being under the sole charge of the parties responsible for the maintenance of the burners; but a technical difficulty of this kind should not be allowed to stand in the way of the accomplishment of what undoubtedly promises to be a substantial public improvement.

On the recommendation of the Works Committee, the Commissioners approved of Mr. Herring's proposals, and resolved to submit them to the Corporation.

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The "N.V." Adjustable Gas Fire principle

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DEVONPORT CORPORATION WATER-WORKS.

The New Reservoir.

On the invitation of the Chairman of the Water Committee (Alderman Blackall), the members of the Devonport Corporation paid a visit to the water-works last Tuesday, with the special object of inspecting the new reservoir in course of construction at Crown Hill, forming part of a scheme of extension and improvement for which parliamentary powers were obtained two years ago. It will be 456 feet long and 431 feet wide; the average depth being 20 feet. Its storage capacity will be over 20 million gallons; and it will be worked in conjunction with another reservoir in the same locality which provides storage for 17½ million gallons. Taken in conjunction with the improvement which has been effected by the substitution of a main for a portion of the open leat, it is anticipated that on the completion of the reservoir Devonport will be freed from anxiety as to the maintenance of the supply of water in times of drought or severe frost. When the reservoir is made, an additional filter-bed will be constructed. The work is being carried out by direct labour, under the supervision of Mr. F. W. Lillicrap, the Corporation Water Engineer, who has found this method entirely satisfactory, and expresses the opinion that it will be more economical than the letting of the work by contract.

The members of the Corporation were conducted over the works by Mr. Lillicrap. Nearly 250,000 cubic yards of ground have still to be excavated, most of it consisting of hard shillet, for which blasting is necessary. As the work was begun last October, the excavation is in a forward state; but it is estimated that nearly two years more will be required for the completion of the reservoir. At the conclusion of the inspection, the members of the Corporation were entertained by the Water Committee. Alderman Blackall expressed the opinion that the Corporation should be highly satisfied with the manner in which the work was being carried out. When the reservoir was finished, they would have no anxiety respecting possible water famines in Devonport. The existing reservoir could only contain about eight days' supply; but with the new one added, they would have water enough to carry them over any reasonable period of drought. In the execution of the work they had the assistance of a good Engineer and an efficient staff. The Mayor (Mr. J. P. Goldsmith) congratulated the Committee and the Engineer on the progress made with the reservoir and on the efficiency with which the work was being carried out. Mr. Grigg, a member of the Committee, and Alderman Hornbrook also spoke of the ability and energy the Engineer brought to the discharge of his duties.

Under the title of John Ruscoe and Co., Limited, a Company has been registered with a capital of £10,000, in £1 shares (3000 preference), to take over the business of mechanical engineers carried on by Messrs. J. Ruscoe and Co., Limited (in liquidation), and the Liquidator thereof, at Hyde, Cheshire.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

At the meeting of the Edinburgh and Leith Gas Commissioners on Monday, a letter from the Clerk to the Water of Leith Purification Commissioners was read, in which it was stated that they had had a discussion on the attitude of the Scottish Office in raising difficulties after an Order had passed the Parliamentary Commissioners; and that it was understood that the Gas Commissioners and the Water Trust had also experienced similar treatment. The Clerk was instructed to write suggesting that a conference might be held, with a view to a joint protest being made in the proper quarter. The Commissioners agreed to enter upon a conference on the subject. Judge Douglas gave notice of motion to the effect that, in view of the number of complaints from consumers who use flat-flame burners, it be remitted to the Engineer to consider and report as to the best and most economical kind of burner to employ with the new quality of gas now being supplied by the Commissioners.

The Finance and Law Committee reported that the Assessors had made up their valuation of the undertaking of the Commissioners at £106,177, and had allocated it in the proportions of £100,406 to Edinburgh, £3282 to Leith, and £2489 to the county of Midlothian. Last year the total valuation fixed by the Assessor for Edinburgh was £99,767, of which £94,393 was allocated to Edinburgh, £3078 to Leith, and £2296 to Midlothian. The valuation was modified by the Court of Session, on appeal, to the extent of reducing the valuation within the city of Edinburgh to £93,166. There is thus a considerable rise in the valuation this year.

The Treasurer—Mr. John S. Gibb—submitted estimates of income and expenditure for the current year, prepared by himself and Mr. W. R. Herring, the Engineer. On the expenditure side, provision is made for the putting through of 187,334 tons of coal, as compared with an actual consumption of 180,620 tons last year; and the price is set down at £93,667, as compared with an actual outlay of £113,056 last year. The total estimate for the manufacture of gas is £145,107, as compared with an outlay of £169,952 last year. Distribution is estimated to cost £28,521, as compared with £27,610. Management is anticipated to cost £11,400, as compared with £11,182; feu-duties are to be £650, as compared with £630; rates and taxes are to be £18,200, as compared with £17,158; pensions and allowances are stated at £1400, as compared with £1473. Contributions to the superannuation fund, under the order of 1908, are new outlays; they amount to £3885. The total expenditure is estimated at £332,603, as compared with £338,981. To meet this, it is assumed that there will be a consumption of gas equal to what was experienced last year—1,882,290,000 cubic feet. Retaining the price at 3s. per 1000 cubic feet till the October-November survey, and thereafter reducing it by 2d. to ordinary consumers and by 6d. to the users of gas-engines, it is estimated that the revenue from the sale of gas will amount to £273,612, against

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EXTRAORDINARY RESULTS.

See Testimonial Letter printed below.

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NORWICH.
May 15th, 1909.

MESSRS. WILSONS & MATHIESONS, LTD.,
LEEDS.

Dear Sirs:—

With reference to the heating of factories by the use of your Hot Water "Circulator" and Radiators, I have much pleasure in sending you the following particulars:

The system was installed last Autumn at the Boot and Shoe Factory of Messrs. Edwards & Holmes, Esdelle Street, Norwich, for the heating of three rooms, viz.:—

Clickers' Room	90 ft. by 25 ft. by 12 ft.
Machine Room	55 ft. by 24 ft. by 12 ft.
Leather Store	30 ft. by 30 ft. by 12 ft.

The installation consists of two **Wilson "Circulators"** in connection with eleven double column, 8 sections by 32 ins. Radiators with 1¼ in. flow pipes, arranged upon what is known as "Flow Only" System, *i.e.*, **one pipe only** taken from the Circulators, quite round the whole of the radiators, and returning to the Circulators.

Tests made during the winter months showed that in actual use its was found that 121 cu. ft. of gas per hour maintained a temperature of 60 degrees, with an outside temperature of 30 degrees. This is equal to a

consumption of 11 cu. ft. per hour per Radiator

(not taking into consideration the piping) and each Radiator at this consumption would maintain 4876 cu. ft. of space at 60 degrees with an outside temperature of 30 degrees;—in other words

1 cu. ft. of gas will maintain at a temperature of 60 degrees 443 cubic feet of space.

The Building is Brick Built with slate roof, plastered ceilings, and the whole of the walls are Outer Walls.

The heat was very evenly distributed and, in all respects, the installation proved a success.

I am, Yours faithfully,
THOS. GLOVER,
Engineer & Manager.

WILSONS & MATHIESONS, LTD., Carlton Works, ARMLEY, LEEDS.

£284,254 received last year. Coke is estimated to realize £25,380, as compared with £30,747; tar, £13,843, as compared with £12,778; and sulphate of ammonia (less working expenses), £18,238, as compared with £18,729. From gas-cookers a revenue of £2677 is expected. The total income is anticipated to be £334,670, as compared with £347,502; and the expected surplus is £2068, as compared with £8520. The Commissioners adopted the estimates, and fixed the price of gas at 2s. 10d. per 1000 feet to ordinary consumers within the city, 3s. 4d. to consumers outside the city, and 2s. 6d. to users of gas-engines. A penny per 1000 cubic feet represents £7843.

The annual meeting of the Banchory Gaslight Company, Limited, was held on Monday. The balance-sheet submitted showed a profit of £104. It was decided to pay the usual dividend of 1s. 3d. per share. No change was made in the price of gas. It was stated that the repairs account had been unusually heavy, owing to renewals of retorts and the purchase of larger purifiers.

We recently recorded, in connection with the proceedings at the inauguration of a new gasholder at Arbroath, the amount of reconstruction work which Mr. A. C. Young, the Manager, has carried through since he went there. He has acted as Engineer in all the work; and it is gratifying to learn that on Wednesday the Gas Committee unanimously resolved to recommend that he be voted an honorarium of one hundred guineas, in recognition of his services to the Corporation.

A meeting of workmen occupying houses belonging to the Fife Coal Company at Auchterdarran was held on the evening of Saturday last, to consider the subject of the use of gas. It was suggested, on behalf of the Company, that the occupants of houses which had been fitted up for gas should pay 1d. per fortnight for the fittings, as is done in other villages where gas has been introduced. The workmen were altogether opposed to the proposal; and it was agreed to ask the Gas Company to put in fittings free. It was resolved to seek power to have the area formed into a special lighting district.

In the Peterhead Town Council on Monday, it was reported that the Auditor had been unable to certify the gas accounts for the year, on account of his not having received all the Treasurer's books. The Town Clerk considered that the incident placed the Council in a somewhat awkward position, because, according to the Act of Parliament, the Auditor's report must be submitted to a meeting of the Council about the end of September. This could not be done now, and the matter would have to stand over till October.

Mr. Andrew Whyte, the Chief Inspector of Weights and Measures in Aberdeen, has submitted his annual report to the Town Council. The number of gas-meters tested during the year, he reports, was 998; and the fees amounted to £31. Of the meters tested, 933 were for the Corporation gas-works, after repair. Of them, 15 were found to be not in accordance with the Sale of Gas Act, and were not stamped, but returned to the works for readjustment. The remaining 65 were tested for consumers; and of them, 24 were found to be correct, while 41 were not. Of the 56 incorrect meters, 40 were fast, six slow, four would not work, three passed gas unregistered, two did not pass the quantity, and one was leaking. The percentage of error in the measurement ranged from 20 per cent. fast to 11·11 per cent. slow.

A story which well illustrates how unenlightened the management of public affairs frequently is, is told from Linlithgow to-day. It is stated that at a meeting of the Linlithgow County Road Board, held yesterday, an appeal was heard, at the instance of the Broxburn Oil Company, against a resolution of the Bathgate District Committee of the County Council, refusing to allow them to open the roadway between Broxburn and Uphall for the purpose of laying down gas-mains. There was also read a petition, signed by about 400 householders in the district, in favour of the appeal. Mr. R. S. Horne, advocate, appeared on behalf of the appellants. He pointed out that from 1877 to 1903 the Broxburn Oil Company supplied the streets of Broxburn with gaslight free of charge. In 1903, the Bathgate District Committee formed Broxburn and Uphall into a special lighting district and introduced electric light into these places. Notwithstanding this, as the result of a plebiscite, 1147 voted in favour of gas and only 64 were in favour of electricity. At the present time there were only 35 consumers of electric light; whereas the consumers of gas numbered 177. Colonel Hope explained the position of the Bathgate District Committee in refusing permission to the Oil Company to open the road. Mr. Horne observed that what seemed to weigh with the District Committee in arriving at their decision was a feeling that the introduction of gas would be in opposition to the electric lighting scheme; and he argued that this consideration should not weigh with the Committee. On a vote being taken, the appeal was sustained by seven votes to four. Permission to supply and use gas is thus given.

Forthcoming Gas Exhibition in Belfast.—With the object of bringing more prominently before the public the many developments which have been made in recent years in the utilization of gas for illuminating and power purposes, an exhibition is to be held in the Ulster Hall from the 12th to the 22nd inst., by the Gas Committee of the Council. It is to be formally opened at noon next Tuesday by the Lord Mayor (Sir Robert Anderson, J.P.).

Explosion in a Street-Box at Derby.—An alarming explosion took place in St. Peter's Street, the main thoroughfare of Derby, late last Wednesday night. It blew up the pavement in six places, and a solicitor's clerk was struck, and sustained a compound fracture of the right leg, which necessitated his removal to the Derbyshire Royal Infirmary. A workman was also injured. A leakage of gas had occurred in the vicinity of the street, but the authorities had been unsuccessful in tracing its origin; and it was assumed that the gas accumulated in the channels containing the electric light cables, as the outlets of the explosion were the manhole covers. When a Corporation employee entered an underground chamber at the top of the street to switch off the electric currents supplying certain arc lamps to the smaller lights used during the night, a spark from the switch ignited the gas in the chamber and caused the explosion.

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LUTON.

CURRENT SALES OF GAS PRODUCTS.

Sulphate of Ammonia. LIVERPOOL, *Oct.* 2.

All immediate requirements being apparently filled, the market has become much quieter, and some decline in values from the highest point reached has taken place. The prices quoted to-day are £11 6s. 3d. per ton f.o.b. Hull, £11 7s. 6d. per ton f.o.b. Liverpool, and £11 8s. 9d. to £11 10s. per ton f.o.b. Leith. In the forward position, there is little doing, as, though there are sellers for delivery up to the end of the year at about prompt values, and for the first half of 1910 at a small premium, buyers for the most part prefer to adopt a waiting policy.

Nitrate of Soda.

This article is again easier, and the quotations, on spot, have now been reduced to 9s. 3d. and 9s. 6d. per cwt. for ordinary and refined qualities respectively.

Tar Products. LONDON, *Oct.* 4.

The markets for tar products have been quiet during the past week, and pitch in particular is dull—a fair amount of business having been done, but at considerably lower prices than had been ruling a short time before. Creosote is quiet, and orders are difficult to secure, though the majority of manufacturers are well sold and seem content to wait before placing any further quantity; but some business has been done for prompt delivery at low figures. Benzol is steady; and though business is very difficult to do for prompt delivery, buyers being full up, yet for forward there is a fair inquiry. In the majority of cases, however, it is on behalf of French buyers, who will only purchase on the understanding that should the proposed tax on imported benzol come into force in France the contracts shall be cancelled. To this, of course, the makers will not agree, seeing that the price which is offered them, even under these conditions, is such a poor one. Fifty-ninety per cent. benzol is steady owing to the good demand for toluol in the North of England. Solvent naphtha is firm, though prices are unchanged. Carbolic acid is very weak; but Continental consumers refuse to buy in the present state of the crystal market. Refined naphthalene is dull, though there is no alteration in price.

The quotations for naphthalene given in the "JOURNAL" are for the refined article, and the variation in price is according to the form and packages in which it is sold.

The average values during the week were: Tar, 13s. 6d. to 17s. 6d., *ex* works. Pitch, London, 27s. 6d. to 27s. 9d.; east coast, 27s. to 27s. 6d.; west coast, 26s. to 27s. f.a.s. Mersey ports, 27s. to 27s. 6d. f.o.b. others. Benzol, 90 per cent., casks included, London, 6¼d. to 6¾d.; North, 5¾d. to 6d.; 50-90 per cent., casks included, London, 7d. to 7¼d.; North, 6½d. to 6¾d. Toluol, casks included, London, 9d.; North, 8¼d. Crude naphtha, in bulk, London, 3¼d. to 3⅜d.; North, 3¼d. to 3⅜d.; solvent naphtha, casks included, London, 11¼d. to 11½d.; North, 10½d. to 10¾d.; heavy naphtha, casks included, London, 10½d. to 11d.; North, 9½d. to 10½d. Creosote, in bulk, London, 2⅝d. to 2¾d.; North, 2½d. to 2⅝d. Heavy oils, in bulk, 2⅜d. to 2⅝d. Carbolic acid, 60 per cent., casks included, east coast, 10½d.; west coast, 10½d. Refined naphthalene, £4 10s. to £8 10s.; salts, 37s. 6d. to 40s., packages included and f.o.b. Anthracene, "A" quality, 1⅛d. to 1⅜d. per unit, packages included and delivered.

Sulphate of Ammonia.

This article has been firm throughout the past week, and the principal Gas Companies quote £11 10s. for prompt, and £11 15s. for forward; but it is possible to buy outside makes upon Beckton terms at considerably under these figures. In Hull, £11 5s. is asked; and in Liverpool, £11 6s. 3d. In Leith, the manufacturers ask £11 10s. for prompt, and £11 15s. for forward, but cannot obtain these figures.

COAL TRADE REPORTS.

Northern Coal Trade.

There is a steadier demand for coal, though for one or two classes it is as yet only moderate. In the steam coal trade, the lessened needs of the upper ports of the Baltic influence both the shipments and the prices. Best Northumbrian steams are quiet at about 10s. 10d. to 11s. 3d. per ton f.o.b., according to the period of delivery. Second-class steams are from 9s. 9d. to 10s. 3d., and steam smalls are about 5s. to 6s. The output at the collieries is now more regular, but it is still not quite up to that which was normal. In the gas coal trade, the demand is increasing steadily, and so far it is well met. Some users seem disposed to stock more freely, in view of possibilities at the end of the year. Durham gas coal varies in price, according to quality. The usual classes are from 10s. to 11s. 3d. per ton f.o.b., and "Wear" specials are quoted up to 11s. 9d. There is a further demand for gas coals for delivery over next year at some of the Italian ports; but as many colliery owners have sold a considerable part of their output, they are inclined to ask higher prices—at any rate, until the question of the eight hours working at the pits is settled. Coke is steady; and the advance in the price of furnace coke is stiffening the value of gas coke. Good gas coke is now quoted from about 13s. to 13s. 6d. per ton f.o.b in the Tyne or Wear.

Scotch Coal Trade.

Trade remains as it was a week ago—the present demand is insufficient to take up the supply, with the consequence that full working time is not being got at some collieries. The brightest outlook is in the forward demand, which is still promising. The prices now quoted are: Ell 9s. to 10s. 6d. per ton f.o.b. Glasgow, splint 9s. 9d. to 10s., and steam 9s. 3d. to 9s. 6d. The shipments for the week amounted to 320,194 tons—a decrease of 7793 tons upon the previous week, and of 3297 tons upon the corresponding week of last year. For the year to date, the total shipments have been 11,334,376 tons—an increase of 751,129 tons upon the corresponding period.

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Sales of Shares.—At a recent sale by Messrs. Tootell and Green, 3 per cent. perpetual debenture stock of the Maidstone Gas Company realized from £37 10s. to £37 15s. per £50 lot. Acting under instructions from the Directors of the Skegness Gas Company, Mr. G. G. Dunkley sold by auction on the 27th ult., 600 new ordinary shares of £5 each in the Company at £6 2s. 6d. and £6 3s. apiece. The hundred £5 "C" shares in the Tonbridge Water Company, for which applications were recently invited by the Directors in the "JOURNAL," were subscribed for three times over; and they have all been allotted at £7 17s. each.

Truro Water Supply.—Owing to a suggestion that the water supplied to the city was contaminated by the percolation of surface drainage into the mains through defective hydrants, the Truro City Council decided to have the hydrants replaced by new ones of the spindle type. At the last meeting of the Council, it was reported that the Water Company had offered to supply and fix 45 hydrants for £80, including the necessary alterations in the mains. The Surveyor, in answer to a question, said the Corporation would fill in the ground after the work was done; and the whole cost would be about £105. The Company's offer was accepted.

Ozone Purification of Neva Water.—In view of the unsatisfactory results obtained during the cholera epidemic, which has lasted more than a year, in connection with the purification of the water of the Neva by means of ordinary sand filters, the water distribution system being exposed to constantly renewed cholera infection, the Municipal Duma and City authorities have decided, according to the "Engineer," to adopt the ozone process for the sterilizing of drinking water, and to erect a large ozone water-works. The sanitary authorities both of the City of St. Petersburg and of the State are of opinion that only by the ozone method will effective purification of the drinking water of St. Petersburg be obtained, as their investigations, those of the German Imperial Sanitary Office, and the Pasteur and Koch Institutes, have shown ozone to be the safest means of ensuring the destruction of bacteria in water.

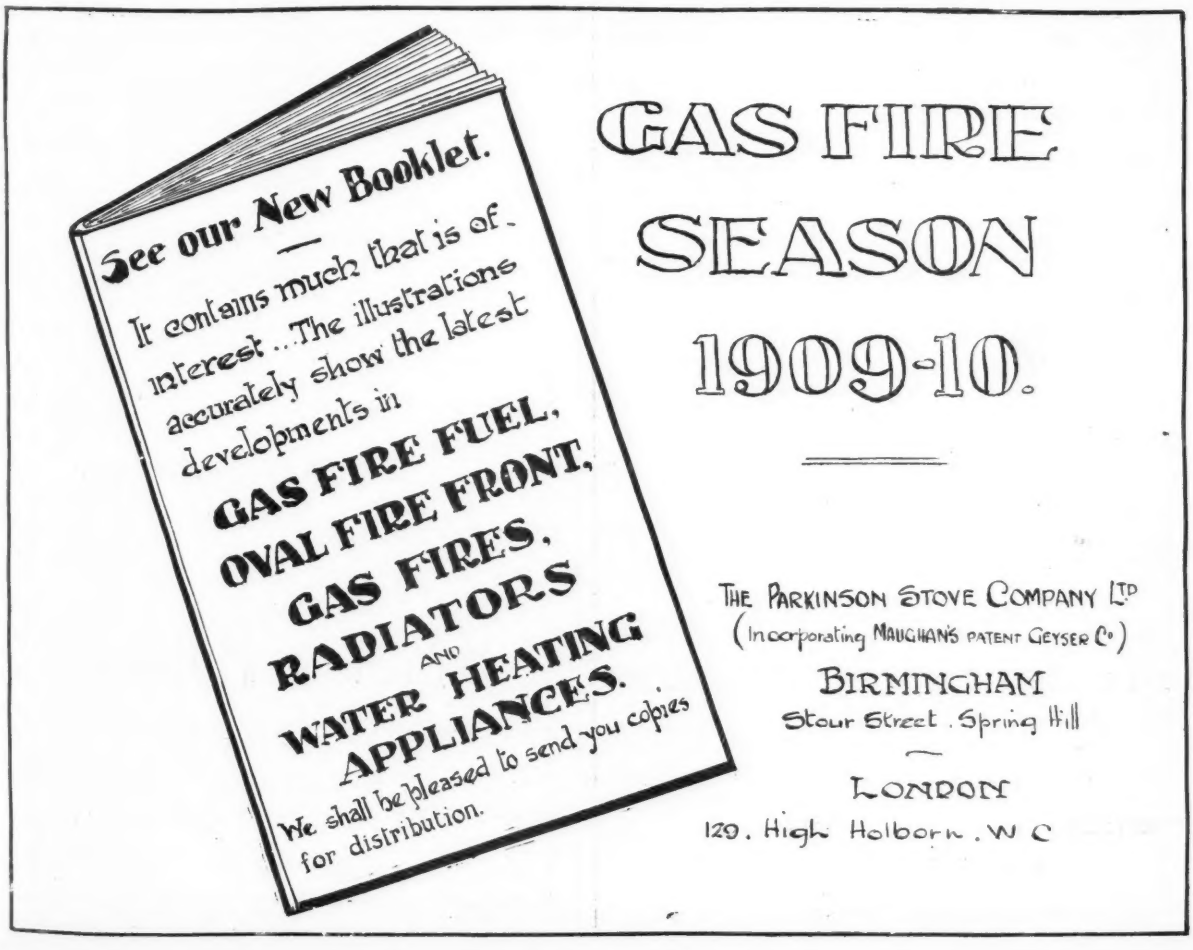
Norwich Town Council and the Gas Undertaking.—By 34 votes to 6, the Norwich Town Council, after some discussion, have adopted a recommendation from the Law and Parliamentary Committee that it is not at the present time expedient to purchase the undertaking of the British Gaslight Company, Limited, for the distribution of gas within the district known as their Norwich station. The mover (Mr. W. G. Stevens) said the Committee had had the matter very carefully under their consideration, and had also had the advantage of a detailed report on the financial aspect from the City Accountant. The Committee thought it was not desirable that this report should be read to the Council in detail; but he was permitted to say that, according to the present state of the Money Market, if the purchase was carried out, it would result in a cost to the city of something approximate to £5000 a year. Under these circumstances, the Law and Parliamentary Committee were almost unanimously of opinion that the gas concern should not be bought at present.

The Proposed Water Board for the Western Valleys.—At a meeting of representatives of the Abertillery, Abercarn, and Risca Urban District Councils at Newport last Wednesday, further consideration was given to the proposal, referred to last week (p. 842), to form a Water Board. It was stated that the Abertillery and Risca authorities had appointed experts to report to them on their present sources of supply. The conference adjourned, so that the Councils mentioned might consider these reports before proceeding to discuss a joint scheme.

Electric Light Failure in Berlin.—According to a telegram which reached London through Reuter's Agency, shortly before seven o'clock on Monday evening last week the electric light suddenly went out in part of the Friedrichstrasse, Berlin, and darkness fell without warning also upon the adjacent streets; the whole centre of the city being affected. Confusion reigned in the numerous business establishments, restaurants, and cafés, and the central telegraph and telephone offices likewise suffered. At ten o'clock darkness still prevailed, and carriages, omnibuses, and motor-cars had to go slowly. Soon after midnight the cause of the trouble was discovered—a defect had developed in a main cable—and light was restored.

Bexhill Water and Gas Company.—The accounts of the Company for the six months ending the 30th of June, which were presented at the ordinary general meeting last Thursday, show a sum of £5175 available for distribution; and the Directors recommend the declaration of dividends at the rates of £7 and £4 18s. per cent. per annum respectively on the two classes of capital, less income-tax. This, with provision for income-tax, will absorb £3769; leaving £1406 to be carried forward. The depression experienced in most seaside resorts was severely felt at Bexhill; and the expansion in revenue, both from gas and water, to which the Directors looked forward was not realized during the half year. Nevertheless, they have decided to reduce the price of gas 3d. per 1000 cubic feet as from June 30.

Chesterfield Water Board's Land Purchase.—It is stated by the "Sheffield Independent" that the Chesterfield Gas and Water Board, an authority comprising representatives of the borough of Chesterfield and the urban districts of Newbold and Whittington, have just emerged from a long and costly litigation. The original question arose as to the value of land taken by the Board from Mr. Bernard Lucas for the purpose of constructing a third reservoir at Linacre. The Board contended that £800 was the highest value Mr. Lucas could put upon the land for his own purposes; but the sum claimed was nearly twice this amount. It was, however, agreed by both parties that something should be paid for its adaptability for reservoir purposes. The Arbitrator of the Board of Trade awarded £1615 as the sum payable by the Board to Mr. Lucas; and on a second hearing, he declined to reduce this sum. The total cost of the proceedings to the Board will probably exceed the amount that has to be paid for the land. The Arbitrator's fees alone for the two awards, which, of course, are payable by the Board, amount to £322 15s. The Board have already paid £130 taxed costs of an appeal against the Arbitrator's original decision; and they will also have to pay the whole of Mr. Lucas's taxed costs.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Water Arrears at Spalding.—Investigations which have just been made by the Spalding Urban District Council have disclosed the fact that about a hundred consumers have either not been paying anything for their water supply or only a portion of the demand. This is particularly the case with regard to baths, for which an additional charge is made, of which many householders are ignorant. The Council have now served a demand for six years' arrears on the parties concerned. Many of the consumers have declined to pay; their contention being that as the Council have made no previous demand, the arrears are irrecoverable.

Extensions at the High Wycombe Water-Works.—The High Wycombe Town Council have decided to carry out a scheme of extension in connection with their water-works. A loan of £7300, repayable in twenty years, has been applied for, and it will not be long before the work is commenced. The extensions will not involve any demand upon the rates; the income from the supply of water being sufficient to meet the repayments of loan and interest. The estimated expenditure includes a well, £560; suction-gas plant, engines, and pumps, £1422; engine-house, £805; rising mains and meters, £2514; and tower, land, and fencing, £1096. Subject to the loan being granted, several tenders have been accepted.

Exmouth Gas Company.—In the course of the report which the Directors of the Exmouth Gas Company presented at the recent half-yearly meeting, it was stated that there had been a steady increase in the sales of gas and residuals, and a marked increase in the amount of profit realized. For some time past the Directors had been considering the question of increasing the storage capacity and plant at the works; and, having taken expert advice, they had resolved to apply for an Act of Parliament to give the Company power to raise the further capital required to meet the outlay which would thereby be occasioned. The total expenditure on revenue account in the half year amounted to £5076; and a balance of £749 was carried to the profit and loss account—the total receipts having amounted to £5825. The balance to be carried forward was £3744. The Chairman (Rev. C. R. Carr), in moving the adoption of the report, said the Company had made 30,000,000 cubic feet of gas, compared with 27,200,000 cubic feet in the corresponding half of last year; and the quantity sold was 26,648,000 cubic feet, against 24,941,000 cubic feet—showing a very satisfactory increase of business. The report was adopted.

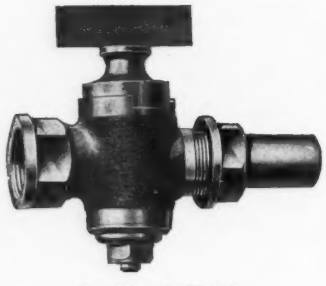
Bridgwater Gas Company.—At the annual general meeting of this Company last Thursday, the Directors reported a net profit of £4609, which was increased to £5458 by interest and the amount carried forward. Interim dividends at the rates of 10 and 5 per cent. per annum had been declared; and there was a balance of £3629 available for distribution. The Directors recommended the payment of final dividends at the above-named rates, which would absorb £1625, and leave a balance of £2004. They proposed to place £487 to the reserve fund and £250 to the insurance fund, and carry the balance of £1267 to the credit of next year's accounts. They expressed their gratification to note that the increased consumption of gas referred to in last year's report had been fully maintained. The works and plant had been kept in an efficient state, and a new sulphate of ammonia apparatus was about to be added. The Company had again secured the contract for the public lighting of the town for a term of five years. The Directors had inaugurated a new scheme for the maintenance of incandescent burners and gas apparatus at nominal charges, which had been largely taken advantage of, and was proving a boon to the consumers. In moving the adoption of the report, the Chairman (Mr. R. Y. Foley, J.P.), congratulated the shareholders on the continued expansion of the business. Referring to the new scheme just alluded to, he said he believed it was a move in the right direction, and would eventually prove of benefit to the Company. The report was adopted. In moving the re-election of Mr. J. Hughes Cornish as Secretary and Manager, the Chairman referred to his careful and zealous work, and that of the staff under him. It was largely due to their loyal service that the position of the Company was so good. Mr. Cornish was asked to convey to the other members of the staff the Directors' appreciation of their services. Mr. Cornish suitably responded on behalf of himself and the staff.

APPLICATIONS FOR LETTERS PATENT.

21,404.—Aston, T. A., "Gas-fittings." Sept. 20.
21,437.—M'Nab, N. S., and Link, J. S., "Lighting and extinguishing gas-lamps and operating valves from a distance." Sept. 20.
21,446.—O'Byrne, P., "Economizing the consumption of gas." Sept. 20.
21,487.—Cox, F. J., "Air-gas apparatus." Sept. 20.
21,553.—Duckham, A. M'D., "Discharging and charging of horizontal gas-retorts or coke-ovens." Sept. 21.
21,554.—Woodall, H. W., and Duckham, A. M'D., "Settings of vertical retorts." Sept. 21.
21,570.—Fetzer, A. H., "Universal joints." Sept. 21.
21,582.—Pritchard, P. M., and United Alkali Company, Limited, "Utilization of heat from liquors discharged from stills or other apparatus." Sept. 21.
21,585.—Oltmans, J., "Air-carburetting apparatus." Sept. 22.
21,663.—Lennox, A. H., "Spraying water in chimneys or flues for washing smoke or other gases." Sept. 22.
21,684.—Plumer, W., "Union joint." Sept. 23.
21,688.—Cannon Iron Foundries, Ltd., and Hawthorne, H. S., "Gas-heated and other radiators." Sept. 23.
21,804.—Loring, F. H., "Lighting and ventilating." Sept. 24.
21,827.—Wagner, F., "Obviating the vibrations of main-pressure actuated-valves." Sept. 24.
21,835.—Buisson, G. A., "Connections for pipes." Sept. 24.
21,873.—Jourdain, P. E. B., "Gas-turbines." Sept. 25.
21,884.—Gill, J., "Manufacture of ferric oxide." Sept. 25.
21,930.—Swan, J. B. R., "Air-gas plants." Sept. 25.
21,942.—Werber, I., "Mantles." Sept. 25.
21,947.—Werber, I., "Mantles." Sept. 25.

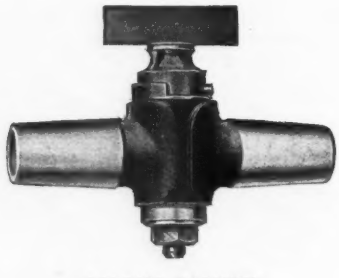
MAIN TAPS

No 119.



ROUND GASWAY.

No. 64.



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MANCHESTER & NOTTINGHAM.

Agent for Scotland:
J. D. GIBSON, 2, CAUSEYSIDE STREET, PAISLEY.

Feltham Public Lighting.—The Feltham District Council have entered into an agreement for three years with the Sunbury Gas Company for the street lighting of the district. The price is to be £3 5s. per lamp per annum, which is to include supplying gas, maintenance of burners, mantles, and lanterns, and providing labour for lighting, extinguishing, and cleaning. The Company are at their own expense to fit up the existing lamps for incandescent lighting with No. 3 Kern burners, and to lay mains where necessary. The lamps are to be lighted from one hour after sunset to 1 a.m. The Company are to erect and fit up all new lamps free; the Council providing columns and lanterns. Any alteration in the position of the existing lamps is to be charged at 7s. 6d. per lamp. The Company are to take over the lighting immediately upon the signing of the agreement.

At a recent meeting of the Worksop Union Assessment Committee, the assessment of the undertaking of the Dinnington and District Gas Company, Limited, was under consideration. The Company had appealed against the assessment, and Mr. J. H. Brearley, of Longwood, was instructed to appear on their behalf. The Committee reduced the assessment in the Dinnington and Anston parishes from £228 to £160.

The "Pall Mall Gazette" last Thursday contained a chatty article on "The Evolution of Gas Lighting," in which the advantages of the incandescent system, especially when "Ironclad" mantles and Bray burners are employed, were fully set forth. The writer, however, went a little astray when dealing with the history of the incandescent mantle, as he stated that its invention "is generally credited to Mr. Thomas Edison." Most people give to Dr. Auer von Welsbach the credit for the production of the mantle. The writer is nearer the mark when he states that "this invention may be said to have produced an entire change in the method of utilizing the gas; and incandescent mantles thus become one of the standard products of the commercial world."

We have received from the Bryan Donkin Company, Limited, of Chesterfield, a useful illustrated catalogue of the drilling and tapping machines and high-pressure service clamps, gas-cocks, &c., produced by the Mueller Manufacturing Company, of New York, for whom the Bryan Donkin Company are the sole European and Colonial licensees. The illustrations are accompanied by full explanatory notes of the various machines and appliances, which have a high reputation among gas engineers in the United States.

Messrs. Falk, Stadelman, and Co., of Farringdon Road, E.C., have just issued their gas-fittings catalogue No. 296; and in submitting it, they call attention to the extensive range of patterns in the various types depicted. The endeavour has been to make each collection or group comprehensive, both from the design and price point of view. Special attention is drawn to the ranges of "convertible" fittings (suitable for use with either upright or inverted burners), as being of interest where it is desired to carry only a limited stock, and yet cater for general requirements. Altogether the catalogue covers a very wide range, and is, it may be mentioned, in addition to the firm's incandescent light catalogue, which contains even fuller information relating to goods of that particular class.

The "Ironmongers' Chronicle" says the most effective ironmongery display in Darlington is that of the Corporation Gas Department, whose show-room is situated in Tubwell Row. It fills up an entire corner block, and has been specially built for the purpose. There are seven large windows in addition to those at each side of the handsome entrance, and the show-room itself is effectively arranged. Our contemporary says: "The manager of the establishment not only knows his business well, but he knows also the position he holds regarding the trade of the ironmongers in the town. Except in the hiring department, no direct business is done. In every case sale must go through one of the local ironmongers; and the discount which the department allows the traders is by no means meagre."

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situation Vacant.

GAS STOVE TRADE (EXHIBITIONS). No. 5142.

Situations Wanted.

IN LABORATORY. Hulbert, Westbury, Wilts.
MANAGER, &c. No. 5143.

Plant, &c. (Second-Hand), for Sale.

GAS PLANT, ENGINES, BOILERS, MACHINE TOOLS, &c. Firth, Blakeley, Sons, and Co. By auction, Oct. 13.
STATION METER. No. 5137.
WASHER, CONDENSERS, EXHAUSTERS AND ENGINES, &c. Coventry Gas Department.

Patent Licences.

PREPAYMENT GAS METER ATTACHMENT. "Patentee," Crosby Road, Birkdale.

Meeting.

DANISH GAS COMPANY. London Agency Offices, Oct. 28. 2.30 o'clock.

Stocks and Shares.

ALDERSHOT GAS, WATER, AND DISTRICT LIGHTING COMPANY. Oct. 26.
ASCOT GAS AND ELECTRICITY COMPANY. Oct. 12.
LOWESTOFT WATER AND GAS COMPANY. Oct. 12.
PINNER GAS COMPANY. Oct. 26.
SOUTHEND WATER COMPANY. Oct. 12.

TENDERS FOR

Benzol.

BRIDGEWATER COAL OFFICE. Tenders by Oct. 25.

Fire-Clay Goods.

ROCHESTER, CHATHAM, AND GILLINGHAM GAS COMPANY. Tenders by Oct. 11.

Oxide (Spent).

THE HAGUE GAS-WORKS.

Sulphuric Acid.

LEICESTER CORPORATION. Tenders by Oct. 9.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 18.

Issue	Share.	When pay. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Apl. 16	10	Alliance & Dublin 10 p.c.	18½–19½	+½	5 2 7
298,955	10	,,	7	Do. 7 p.c.	13–13½	+¼	5 3 8
310,000	Stk.	July 14	4	Do. 4 p.c. Deb.	96–98	..	4 0 0
200,000	5	May 27	6½	Bombay, Ltd.	5⅞–6	..	5 8 4
40,000	5	,,	6½	Do. New, £4 paid	4½–4⅝	..	5 9 6
50,000	10	Aug. 26	15	Bourne-mouth Gas & Water Pref. 6 p.c.	28–28½	..	5 5 3
311,810	10	,,	7		16⅝–16¾	..	4 3 7
75,000	10	,,	6		15⅝–15⅞	..	3 16 8
380,000	Stk.	Aug. 12	12½	Brentford Consolidated	253–256	+1	4 17 8
300,000	,,	,,	9½	Do. New	190–192	..	4 19 0
50,000	,,	,,	5	Do. 5 p.c. Pref.	120–122	..	4 2 0
206,250	,,	June 11	4	Do. 4 p.c. Deb.	100–102	..	3 18 5
220,000	Stk.	Sep. 10	1	Brighton & Hove Orig.	208–213	..	5 3 3
246,320	,,	,,	8	Do. A Ord. Stk.	150–152	..	5 5 3
460,000	20	Apl. 16	10	British	43–43½	..	4 11 11
109,000	Stk.	Aug. 26	6	Bromley, A 5 p.c.	118–120	..	5 0 0
165,700	,,	,,	4½	Do. B 3½ p.c.	83–90	..	5 0 0
82,278	,,	,,	5½	Do. C 5 p.c.	106–108	..	5 1 10
51,000	,,	June 25	3½	Do. 3½ p.c. Deb.	88–90	..	3 17 9
500,000	10	May 13	7	Buenos Ayres (New) Ltd.	13⅞–14¼	..	4 18 3
250,000	Stk.	June 25	4	Do. 4 p.c. Deb.	95–97	..	4 2 6
103,000	10	—	—	Cape Town & Dis., Ltd.	4½–5	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	5½–6	..	—
50,000	50	May 3	6	Do. 6 p.c. 1st Mort.	48½–49½	..	6 1 3
100,000	Stk.	June 25	4½	Do. 4½ p.c. Deb. Stk.	82–84	..	5 7 2
157 150	Stk.	Aug. 12	5	Chester 5 p.c. Ord.	106½–108½	..	4 12 2
1,491,280	Stk.	Aug 26	5 5/16	Commercial 4 p.c. Stk.	109–111	+1	4 13 8
560,000	,,	,,	5	Do. 3½ p.c. do.	104–105	..	4 14 4
475,000	..	June 11	3	Do. 3 p.c. Deb. Stk.	81–83	..	3 12 3
800,000	Stk.	,,	5	Continental Union, Ltd.	95–97	..	5 3 1
200,000	,,	,,	7	Do. 7 p.c. Pref.	138–140	..	5 0 0
491,270	Stk.	—	5	Derby Con. Stk.	121–123	..	4 1 4
55,000	,,	—	4	Do. Deb. Stk.	103–105	..	3 16 2
143,995	,,	Oct 2	5	East Hull 5 p.c. Ord.	97–99*	–½	5 1 0
486,093	10	July 14	12	European, Ltd.	24½–25	..	4 16 0
351,060	10	,,	12	Do. £7 10s. paid.	18½–19	..	4 14 9
15,141,545	Stk.	Aug. 12	4⅝	Gas light and Coke 4 p.c. Ord.	106–107	+½	4 7 2
2,630,000	,,	,,	3½	3½ p.c. max.	88–90	..	3 17 9
3,793,735	,,	,,	4	4 p.c. Con. Pref.	103–105	..	3 16 2
4,193,975	,,	June 11	3	3 p.c. Con. Deb.	85–87	..	3 8 11
258,740	Stk.	Sep 10	5	Hastings & St. L. 3½ p.c.	92–94	..	5 6 4
82,530	,,	,,	6½	Do. do. 5 p.c	117–119	..	5 9 3
70,000	10	Sep. 29	11	Hongkong & China, Ltd.	17½–17¾*	..	6 4 0
131,400	Stk.	Sep. 10	6½	Ilford A and C	138–140	..	4 14 10
65,781	,,	,,	5	Do. B	105–107	..	4 13 6
65,500	,,	June 25	4	Do. 4 p.c. Deb.	102–104	..	3 16 11
4,940,000	Stk.	May 13	8	Imperial Continental	179–181	+1	4 8 5
1,235,030	Stk.	Aug. 12	3½	Do. 3½ p.c. Deb. Red.	95–97	..	3 12 2

Issue	Share.	When pay. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
195,242	Stk.	Aug. 26	6	Lea Bridge Ord. 5 p.c.	119–121	..	4 19 2
561,000	Stk.	,,	10	Liverpool United A	223–225	..	4 8 11
718,100	,,	,,	7	Do. B	165–167	..	4 3 10
306,083	,,	June 25	4	Do. Deb. Stk.	104–106	..	3 15 6
75,000	5	June 11	6	Malta & Mediterranean.	4⅜–5⅜	..	5 17 1
550,000	100	Oct. 1	5	Met of 5 p.c. Deb.	99–102*	–½	4 18 0
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	100–102*	..	4 8 3
541,920	20	May 27	3½	Monte Video. Ltd.	12¾–13¼	..	5 5 8
1,775,892	Stk.	July 29	4½	Newc'tle & G'tesh'd Con.	107–108	..	4 3 4
518,795	Stk.	June 25	3½	Do. 3½ p.c. Deb.	93–94	+1	3 14 6
55,940	10	Aug. 26	7	North Middlesex 7 p.c.	13–13½	..	5 3 8
300,000	Stk.	Apl. 29	8	Oriental, Ltd.	139–141	..	5 13 6
60,000	5	Sep. 10	8	Ottoman, Ltd.	6⅜–6⅝	+⅛	6 5 6
31,830	53	Aug. 26	13	Portsea Island A.	137–139	..	4 19 0
60,000	50	,,	13	Do. B.	129–131	..	4 19 3
100,000	50	,,	12	Do. C.	120–123	..	4 17 7
114,800	50	,,	10	Do. D and E.	101–103	..	4 17 1
398,490	5	May 13	7	Primitiva Ord.	7⅛–7⅜	+1/16	4 14 11
796,980	5	July 29	5	Do. 5 p.c Pref.	5¼–5⅜	..	4 10 11
488,900	100	June 1	4	Do. 4 p.c. Deb.	94–96	..	4 3 4
1,200,000	10	Apl 29	8	River Plate Ord.	16½–17½	..	4 12 9
312,650	Stk.	June 25	4	Do. 4 p.c. Deb.	96–98	..	4 1 8
250,000	10	Sep. 29	8	San Paulo, Ltd.	14⅛–14⅜*	+⅛	5 8 6
62,500	10	,,	6	Do. 6 p.c. Pref.	11¼–12⅛*	..	4 18 0
125,000	50	July 1	5	Do. 5 p.c. Deb.	49½–50½	..	4 19 0
135,000	Stk.	Sep. 10	10	Sheffield A	230–232	..	4 6 2
209,984	,,	,,	10	Do. B	229–231	..	4 6 7
523,500	,,	,,	10	Do. C	229–231	..	4 6 7
70,000	10	June 11	10	South African	13¾–14	..	7 2 10
6,429,895	Stk.	Aug. 12	5⅛	South Met., 4 p.c. Ord.	120–122	+1	4 7 4
1,895,445	,,	July 14	3	Do. 3 p.c. Deb.	85–87	..	3 8 11
209,820	Stk.	Aug. 26	8	South Shields Con. Stk.	153–155	..	5 3 3
605,000	Stk.	Aug. 12	5½	S'th Suburb'n Ord. 5 p.c.	118–120	..	4 11 8
60,000	,,	,,	5	Do. 5 p.c. Pref.	120–122	..	4 2 0
117,058	,,	July 14	5	Do. 5 p.c. Deb. Stk.	122–124	..	4 0 8
502,310	Stk.	May 13	5	Southampton Ord.	111–113	..	4 8 6
120,000	Stk.	Aug. 12	6⅞	Tottenham A 5 p.c.	131–135	..	5 1 9
453,940	,,	,,	5⅝	and B 3½ p.c.	111–113	..	4 15 3
149,470	,,	June 25	4	Edmonton 4 p.c. Deb.	100–102	..	3 18 5
182,380	10	June 11	8	Tuscan, Ltd.	9–9½	..	8 8 6
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	99–101	..	4 19 0
236,476	Stk.	Aug. 14	5	Tynemouth, 5 p.c. max.	109–111	..	4 10 1
255,6 6	Stk.	Aug. 26	6⅝	Wands-worth B 3½ p.c.	139–141	..	4 14 0
79,416	,,	June 25	3	3 p.c. Deb. Stk.	73–75	..	4 0 0
835,872	,,	Aug. 12	5⅝	West Ham 5 p.c. Ord.	124–126	..	4 5 4
210,000	,,	,,	5	Do. 5 p.c. Pref.	127–129	..	3 17 6
253,300	,,	June 25	4	Do. 4 p.c. Deb Stk.	112–114	..	3 13 2

Prices marked * are "Ex div."

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No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

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Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

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"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

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We guarantee promptness, with efficiency for Repairs.
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Telegraphic Address: "Carburine, London."

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GAS LIGHTING ENGINEERS AND CONTRACTORS,
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Telegrams: "DACOLIGHT LONDON." Telephone: 2336 HOLBORN.

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Telegrams: "DORIC," Newcastle-on-Tyne. National Telephone No. 2497.

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Telephone: 341 AVENUE.

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See Advertisement on p. 72.
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PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no back Pressure.
The Cheapest in the Market.
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SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
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APPLICATIONS for Appointments arranged effectively. Greatly appreciated by Recipients. Numerous unsolicited Testimonials. Write Now for Particulars.
Herbert Greatorex, Upper Hackney, Matlock.

MR. WM. CRANFIELD, F.C.S., in response to requests, has decided to extend the work he has been carrying on by Gas Classes in various Yorkshire Towns for the past Ten Years, and to organize postal courses of Tuition in "Gas Engineering" and "Gas Supply." Close personal attention will be given to the needs of each individual Student, and Expert Assistance has been engaged. All Inquiries treated confidentially.
Full Particulars on Application to No. 11, Avondale Place, Halifax.

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THIS Year, our Students in Honours Gas Engineering took over one-third places in First-Class and Silver Medal. Six Medals and 80 Passes in last Two Years. Courses starting in Gas Engineering and Supply, &c. Have you a Copy of our Success Book, describing our Special Individual System? No more Failures.
Correspondence College Company, Dept. B., 26, Green Street, Cambridge.

COLESHILL GAS COMPANY, LIMITED.

MANAGER.

THIS Post has now been Filled. Applicants who sent ORIGINAL TESTIMONIALS please Communicate with the Secretary, Church Hill, Coleshill, near Birmingham.

LABORATORY—Advertiser desires Employment in a Gas-Works or other Technical LABORATORY. Holds distinctions in Science and Chemistry, and has passed London Matric. Four years at Hartley University College. Some experience in Teaching Science.
Address Hulbert, Westbury, Wilts.

GAS Engineer and Expert in Petrol Light Plants seeks Position as MANAGER or any Position of Trust. Well up in all the latest Plants. First Class Demonstrator. Experimenter and Commercial Experience. Age 32.
Address, in first instance, No. 5143, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

GAS-STOVE TRADE—Experienced Exhibition Men required at once for Important Exhibitions.
Apply, by letter, with full Particulars of Qualifications, including Age and Experience, to No. 5142, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

SMALL Gas Companies desirous of Purchasing GAS APPARATUS Cheap are requested to Note AUCTION SALE on Wednesday, Oct. 13, of GAS PLANT STOCK of Firth Blakeley, Sons, and Co., Ltd., Dewsbury.
Particulars and Catalogues on Application.

FOR SALE—An Important Parcel of SPENT OXIDE, with full 60 per Cent. Sulphur; no Cyanogen.
For further Particulars, write to the Gas-Works, The Hague, Holland.

THE Coventry Corporation have For SALE, owing to the Dismantlement of their old Gas-Works, the following GAS APPARATUS:—
One Two Million Cubic Feet per diem LIVESEY WASHER, 10 ft. by 8 ft. by 3 ft. 6 in. deep, with 18-inch diameter Connections.
Two Sets of Morris and Cutler's Water-Tube CONDENSERS, each of a Capacity of 750,000 Cubic Feet per diem, with 14-inch diameter Connections and Disc Valves.
Three Batteries of Marshall's Water-Tube CONDENSERS, of a Capacity of Two Million Cubic Feet per diem, with 18-inch diameter Connections and Valves.
Two Dempster's Reciprocating EXHAUSTERS, with STEAM-ENGINES on Same Bed Plate, Steam Governors, and Connections, and Disc Valves. One Set 60,000 Cubic Feet per hour, and the other 100,000 Cubic Feet per hour Capacity.
Further Particulars and Prices may be obtained from the undersigned.
Fletcher W. Stevenson, Engineer and Manager.
Gas-Works, Coventry, Sept. 22, 1909.

SECOND-HAND Station Meter by Parkinson FOR SALE. Capacity, 20,000 Cubic Feet per Hour. Cylindrical Tank, fitted with Clock and Tell Tale. First-Class Condition. Just thoroughly Overhauled.
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RETORTS, &c.

THE Directors invite Tenders for the Supply of FIRE-CLAY RETORTS, FIRE-BRICKS, and CLAY.
Specifications and Forms of Tender may be obtained from the undersigned, to whom Tenders, endorsed "Retorts, &c.," must be delivered on or before noon of Monday, Oct. 11, 1909.

J. M. Veevers, Engineer and General Manager.
Gas Offices, Rochester, Sept. 30, 1909.

BRIDGEWATER COLLIERIES COKE WORKS.
(The Earl of Ellesmere.)

TENDERS are invited for the Crude BENZOL produced at the above Works (estimated at 8000 to 10,000 Gallons per Month) testing 80 per cent. at 120° C., during the next Three, Six, Nine, or Twelve Months, delivered into Contractor's Tanks at the Bridgewater Colliery Siding, Wharton Hall, on the Pendleton and Hindley Branch of the Lancashire and Yorkshire Railway, or at the Brackley Siding on the Little Hulton Mineral Branch of the London and North Western Railway.
Tenders, endorsed "Tender for Crude Benzol," to be addressed to Mr. Thomas M. Brown, Bridgewater Coal Offices, 4, Chapel Walks, Manchester, not later than the 25th inst.
Manchester, Oct. 5, 1909.

CORPORATION OF LEICESTER.

SULPHURIC ACID.

THE Gas and Electric Lighting Committee of the above Corporation are prepared to receive TENDERS for the Supply of SULPHURIC ACID, made from either native Sicilian Brimstone, recovered Sulphur, or Pyrites. Specific Gravity in each case to be stated. The Price to include Free Delivery by Rail into Elevated Tanks, 27 feet high, at the Chemical Works, Aylestone Road.
Probable Quantity, about 2000 Tons, to be delivered as required during the ensuing Twelve Months.
Tenders, addressed to Mr. Councillor Jennings, Chairman, and endorsed "Tender for Acid," to be delivered at these Offices not later than Eleven o'clock a.m., on Saturday, Oct. 9, 1909.
The Committee do not bind themselves to accept the lowest or any Tender.
Alfred Colson, M.Inst. C.E., Engineer and Manager.
Gas Offices, Millstone Lane, Leicester, Sept. 28, 1909.

DANISH GAS COMPANY.

NOTICE is Hereby Given, that the FIFTY-FIFTH ANNUAL ORDINARY GENERAL MEETING of this Company will be held at the Offices of the Company's London Agency, Millbank House, Westminster, on Thursday, the 28th day of October next, at 2.30 p.m., for the following purposes—viz:
1—To receive the Report of the Directors and the Accounts for the Year ended June 30, 1909.
2—To Declare a Dividend.
3—To consider the re-election of the Director retiring by rotation.
4—To elect Auditors for the ensuing Year.
By order of the Board,
H. G. Warren, London Agent.
London Agency: Millbank House, Westminster, S.W., Oct. 1, 1909.

WEDNESDAY, OCTOBER 13, 1909.

TO GAS ENGINEERS, GAS COMPANIES, MACHINERY DEALERS, AND OTHERS.

WHEATLEY KIRK, PRICE, AND CO. have received Instructions from Messrs. Firth Blakeley, Sons, and Co., Limited, whose Lease of Premises shortly expire, to Offer for SALE BY PUBLIC AUCTION, piecemeal in the Lots of the Catalogue, upon the Works Premises, situate in Thornhill, Dewsbury, Yorks., on Wednesday, October 13, 1909, commencing at Eleven o'clock prompt, the

SURPLUS STOCK OF NEW AND SECOND-HAND GAS PLANT, ENGINES, BOILERS, MACHINE TOOLS, &c.

The Catalogue will include:—
Dowson's Gas-Producing Plant for 300 B.H.P. Engines; 16 Exhausters, steam-driven and otherwise; 2 Livesey Washers; Pipe and Annular Condensers; Clapham and Cutler's Condensers; several Sets of Purifiers; Belt and Steam-Driven Pumps; Station Governors; Test Meters and Holders, from 16 ft. to 50 ft. diameter; Large Stock of Pipes and Valves, from 2 inches to 18 inches diameter; Shafting and Pulleys; 4 Lathes; Drilling, Planing, Punching, and Shearing, Plate-Edge Planing, Screwing, &c. Machines; Horizontal and Vertical Steam-Engines, Boilers.
The whole may be viewed on Monday and Tuesday, October 11 and 12, and Morning of Sale.
Catalogues may be obtained (gratis) from the Auctioneers, Albert Square, Manchester; 46, Watling Street, London, E.C., and 26, Collingwood Street, Newcastle-on-Tyne.

THE Proprietor of Patent No. 7305, 1909, for "IMPROVED PREPAYMENT GAS-METER ATTACHMENT," is desirous of entering into Arrangements by way of LICENSE on Reasonable Terms.
Address "Patentee," 29, Crosby Road, Birkdale.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.
Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to Messrs. A. & W. Richards, at 18, Finsbury Circus, E.C.

By order of the Directors of the
SOUTHEND WATER-WORKS COMPANY.

NEW ISSUE OF 750 NEW ORDINARY FIVE PER CENT. MAXIMUM £10 SHARES.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Oct. 12, at Two o'clock, in Lots.
Particulars of the Auctioneers, 18, Finsbury Circus, E.C.

By order of the Directors of the
LOWESTOFT WATER AND GAS COMPANY.

NEW ISSUE OF 400 ADDITIONAL ORDINARY £10 SHARES,
AND
£1000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Oct. 12, at Two o'clock, in Lots.
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By order of the Directors of the
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NEW ISSUE OF £2520 FOUR-AND-A-HALF PER CENT. PERPETUAL DEBENTURE STOCK,
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By order of the Directors of the
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Lecturer on Chemistry at the Royal Naval College, Greenwich.

A Course of Lectures Monday Evenings 8 to 9 p.m. Commencing **Monday, Oct. 18.**

FUEL ANALYSIS.

By C. O. BANNISTER, Assoc.R.S.M., M.I.M.M.

A Course of Laboratory Work. Summer Term, Mondays, 7 to 10 p.m. Commencing **Monday, April 18, 1910.**

TECHNICAL GAS ANALYSIS.

By CHARLES A. KEANE, D.Sc., Ph.D., F.I.C.

A Course of Laboratory Work. Summer Term, Wednesdays, 7 to 10 p.m. Commencing **Wednesday, April 20, 1910.**

The Courses of Instruction are arranged to meet the requirements of those engaged in Chemical and Engineering Works or who are concerned with the use of Fuel as a Motive Power.

Detailed Syllabus of the Courses may be had upon Application.

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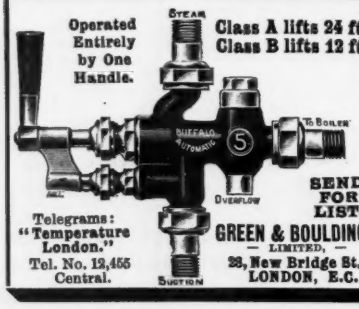

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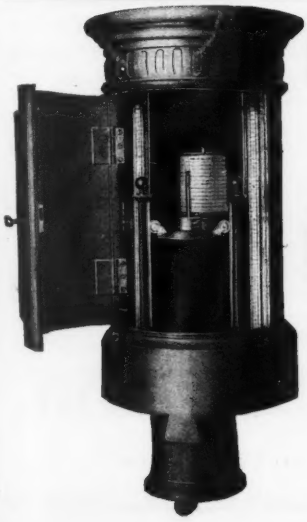

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A. The Authors used *Flanged Pipes* for the Rising Main up the Steep side of the Barff, and their experience proved that this was not an advantage, as *the rigidity of the Joints involved considerable difficulty* in regard to the depth of the Trench, and a good deal of Cutting to make the final Connections at each end of the Pipe-Line.

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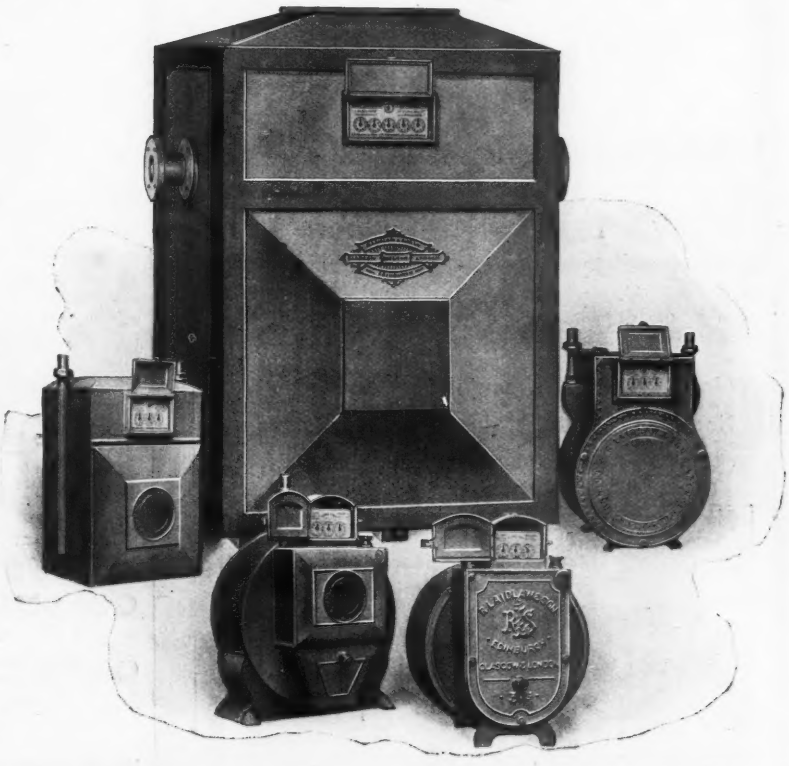

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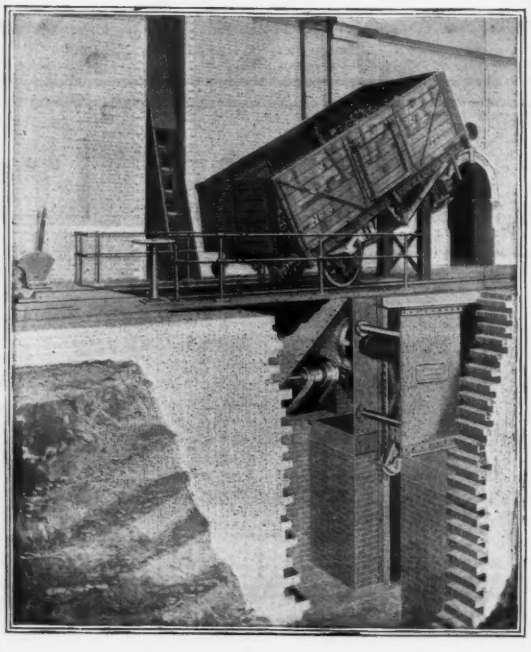

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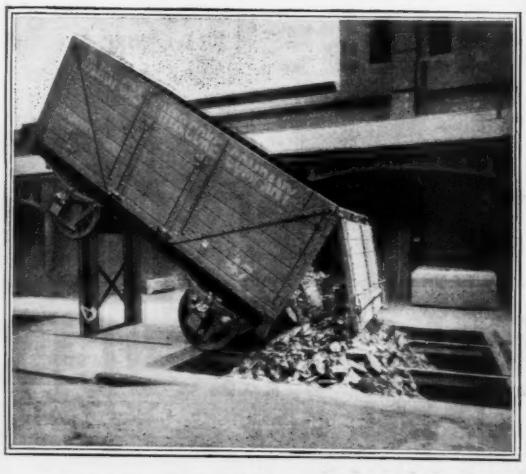

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INVERTED BURNERS.

No. 3 "DARWIN." 3½in. Fitting.

Have been remodelled, and we now offer you

BETTER BURNERS
AT
REDUCED PRICES

And guarantee the highest finish and Workmanship.

Independent Test by a well-known Gas Manager of No. 3 Burner.

CONSUMPTION . . . 3·55 ft.
of Gas at 15/10ths Pressure,

CANDLE POWER . . . 122·76

These figures speak for themselves.

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Reduced to a minimum.

Made in 3 SIZES and 8 PATTERNS

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IMMEDIATE DELIVERY FROM STOCK.
UNBREAKABLE.
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PATENT PRESSED STEEL TANKS.
MADE FROM FLANGED PLATES 4 FT. SQUARE.
ANY CAPACITY IN MULTIPLES
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Aggregate capacity of Plants supplied,
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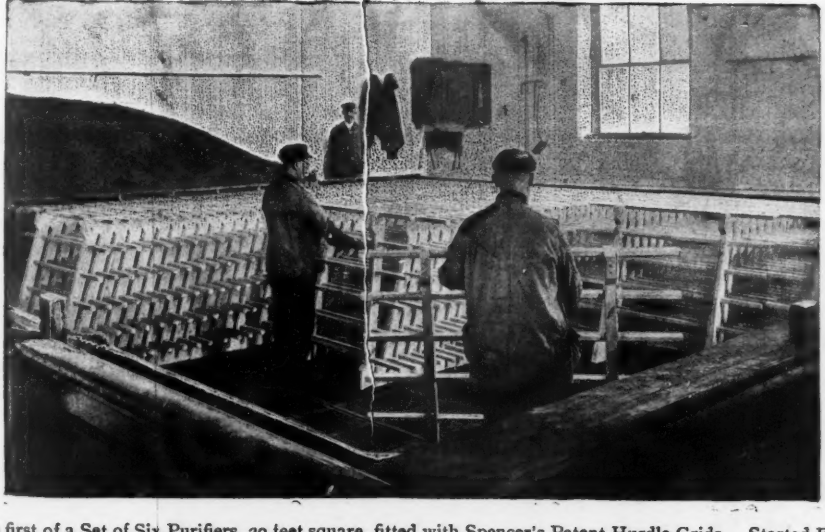
SPENCER'S PATENT HURDLE GRID

The very best Patent Grid on the Market for Holding Oxide Lightly.

IT IS THE FIRST AND THE ORIGINAL DEEP GRID INVENTED.



It is acknowledged by all the leading Gas Managers, that breaking up the Material, and suspending same in the Purifier as it were is the most practical of any system yet made use of.

These Grids are being more extensively used and more successful than ever, not only in this Country, but we are sending a good many Orders abroad. Also we have installed at a certain Works 20 Sets, 5 repeat Orders of 4 Sets each, and at several other places 3 and 4 repeat Orders of 4 Sets each.

And the price of Hurdle Grids is very little more than Flat Grids, and do Three times the work, besides reducing back pressure on the Purifiers more than half.

The Hurdle Grids save their cost in less than 3 Years, and they can be fitted to any kind of Purifier.

The first of a Set of Six Purifiers, 20 feet square, fitted with Spencer's Patent Hurdle Grids. Started Feb. 7, 1906, and run until May 27, 1907, having passed **149,266,000** feet. The Oxide was quite loose and easy to empty. Also over **600** Purifiers have been fitted with these Grids in less than Three-and-a-Half Years. Hundreds of References can be had on Application. Send for Catalogue to—

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Furnaces for Chamber Settings (*Patent*), New Coke Ovens (*Patent*),

With and without Recovery of the Bye-Products, Tar and Benzol Distilleries, Ammonia Works, and Cyanogen Extraction Plants.

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Benzol, Toluol, Solvent Naphtha, Creosote Oils, Grease Oils, Carbolic Acid, Dark Cresylic Acid, Granulated (Crude) and Sublimed Naphthalene, Anthracene, Refined Tar and Pitch. Sulphate of Ammonia up to 20·75 per cent. Nitrogen.

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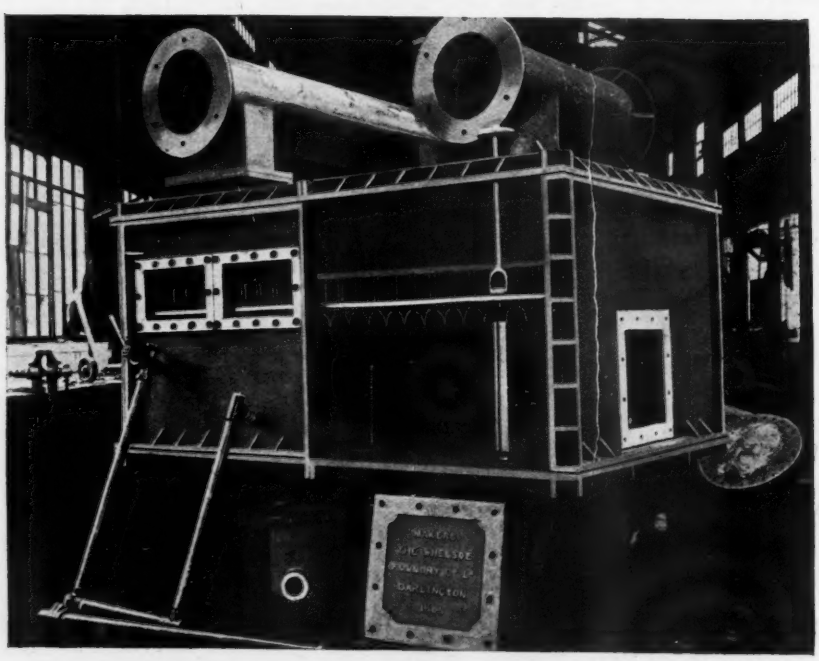

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Livesey Washer, in course of construction in our Works.

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Welsbach
LIGHT
Inverted Arc Lamp, Fig. 623.

Storm Proof—
For Exterior Lighting.

Welsbach-Kern
(Patent) Inverted System

BRITISH MADE.

BRITISH MADE.

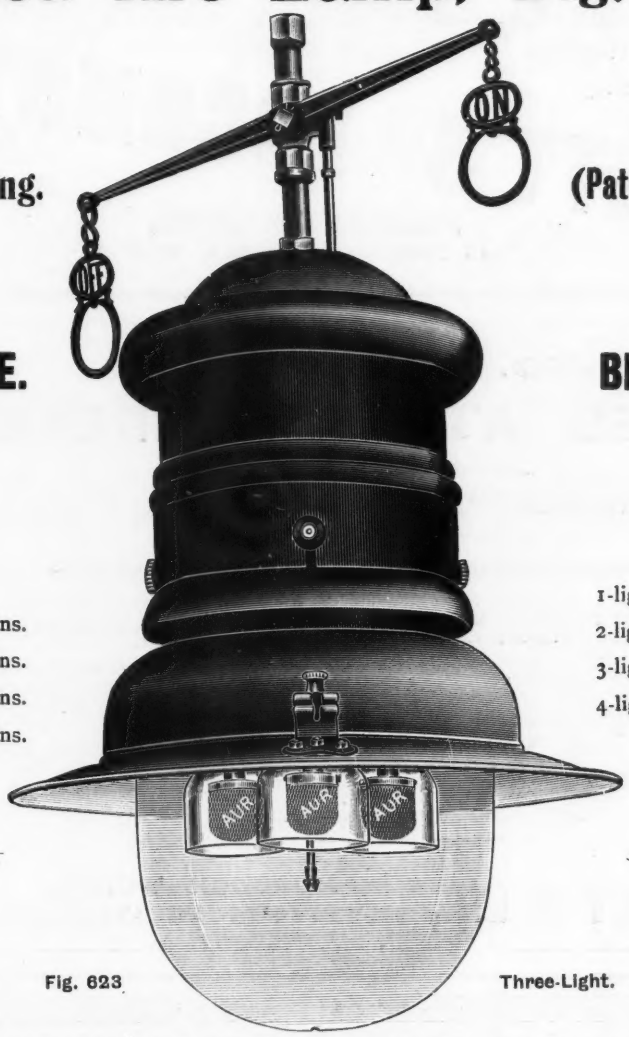

Fig. 623 Three-Light.

Height over all.

1-light . . .	1 ft. 8 ins.
2-light . . .	2 ft. 4 ins.
3-light . . .	2 ft. 4 ins.
4-light . . .	2 ft. 7 ins.

Width over all.

1-light . . .	1 ft. 1 in.
2-light . . .	1 ft. 5 ins.
3-light . . .	1 ft. 5 ins.
4-light . . .	1 ft. 8 ins.

ENAMELLED Green Steel Casing, fitted with Welsbach-Kern Inverted Burners, Gas and Air Regulators operated from outside. Sliding Door to give access to Burners for cleaning purposes. Fitted with Magnesia Nozzles, Welsbach Mantles, and Glass Mantle Protectors. Complete as shown. Highly efficient and regenerative.

	Gas per hour.	*C.P.*	*Steel.*	*Copper Case.*
1-light	4 feet	125	**30/-**	**5/-** extra.
2-light	8 feet	260	**47/6**	**6/-** extra.
3-light	12 feet	400	**52/6**	**6/-** extra.
4-light	16 feet	550	**72/6**	**9/-** extra.

All on or off, or One light on and the rest off, **7/6** per Lamp extra. Cup and Ball, **3/6** per Lamp extra.

RENEWALS.

Glass Mantle Protectors (Fig. 623) **3/4½** per dozen, or in case lots of 5 gross, **33/-** per gross.

	1-Light.	*2-Light.*	*3-Light.*	*4-Light.*
Clear Glass Globes, each	**2/3**	**5/9**	**5/9**	**9/-**
" " " In Case lots per dozen.	**19/6**	**57/9**	**57/9**	**93/-**
Case contains . .	*80*	*18*	*18*	*12*

	1-Light.	*2-Light.*	*3-Light.*	*4-Light.*
Wired Globes, extra each	**2/-**	**2/-**	**2/9**	**3/6**
Parabolic Reflector, extra "	**3/6**	**6/-**	**7/6**	Not made

Welsbach Mantles, each **6d.** subject as usual.

The Welsbach Mantles for Upright lighting are "C," "CX," and "Plaissetty," price **4½d.** each.

THE WELSBACH INCANDESCENT GAS LIGHT CO., LTD.,
Welsbach House, 344-354, Gray's Inn Road, London, W.C.

Telegrams and Cables: "WELSBACH LONDON." *Telephone 2410 NORTH.*

THE WIGAN COAL & IRON CO., LIMTD.,

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Workmanship and Materials of the Highest Quality.

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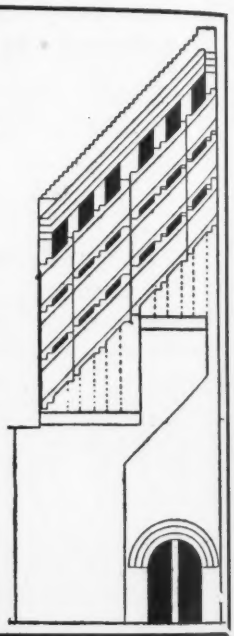
INCLINES AT 45 DEGREES.

CARBONIZATION MADE EASY.

A Few Recommendations for this System:—

Simplicity of Design.
No Machinery to get out of order.
Carbonizing charges 40 per cent. less than with Horizontals.
No skilled Stokers necessary.
Yield of Gas per ton guaranteed about 1000 cubic feet more than under present conditions, of guaranteed candle power.
Heats under absolute control throughout the whole length of the Retorts.
Saleable value of Coke greatly increased.
25 per cent. greater yield of Ammonia.
More liquid Tar.
Stopped Pipes unknown.
Naphthalene always in solution.
45 per cent. less ground space required.
Constructional cost per Ton carbonized considerably less than with Horizontal or Ordinary Inclined Retorts.
Several Installations in course of construction or completed.



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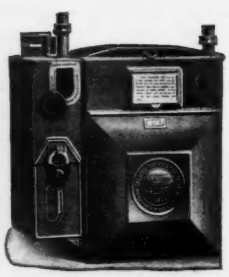

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Carburetted Water Gas Plant.

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The DESSAU System has been adopted at 45 Gas-Works and up to the present date 3882 Retorts have been ordered.

WATER TUBE CONDENSERS. PURIFIERS.

OIL TANKS. ROOFS. GIRDERS.

Every Requirement for Gas-Works Supplied.

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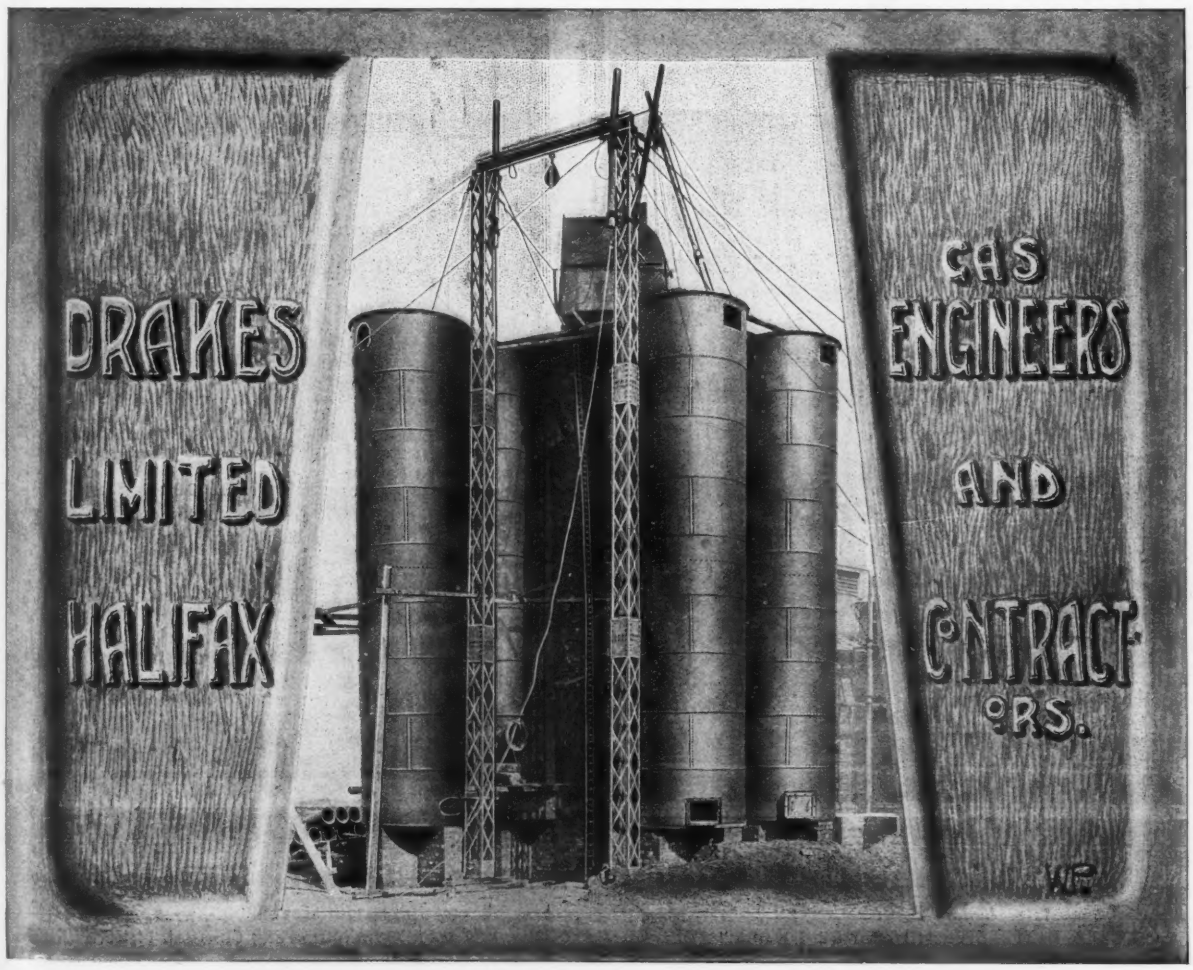

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VERTICAL RETORTS

GLOVER-WEST PATENTS.

Extracts from Tests made by

Dr. HAROLD G. COLMAN

at the St. Helens Gas Works,

DURHAM (THORNLEY) COAL.

Gas made per Ton	13,102	cubic feet.
Fuel Consumption	12·3	lbs. per cent.
Illuminating Power	15·56	No. 2 Met. Burner.
Calorific Value	573·6	B.Th.U. (Gross).

YORKSHIRE (SILKSTONE), BARROW COLLIERY.

Gas made per Ton	12,435	cubic feet.
Fuel Consumption	13·4	lbs. per cent.
Illuminating Power	16·19	No. 2 Met. Burner.
Calorific Value	584·9	B.Th.U. (Gross).

LANCASHIRE, WIGAN (ARLEY MINE).

Gas made per Ton	12,145	cubic feet.
Fuel Consumption	12·2	lbs. per cent.
Illuminating Power	15·22	No. 2 Met. Burner.
Calorific Value	576·2	B.Th.U. (Gross).

See "JOURNAL OF GAS LIGHTING," June 8 & July 20, 1909, for description and results.

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